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[OFFICIAL NOTICE.]

The American Gas Light Association's Greeting to European Gas Engineers.

AMERICAN GAS LIGHT ASSOCIATION, OFFICE OF SECRETARY,
PROVIDENCE, R. I., June 5th, 1893.

To the European Gas Engineers—Greeting: The American Gas Light Association will hold its 21st annual convention in the city of Chicago, beginning on the date of Wednesday, October 18th, 1893. It would give the members of the Association great pleasure to meet there as many of the European gas engineers and managers as can make it convenient to be in attendance at the World's Fair at that time. It is suggested that all contemplating visiting the Fair arrange their visits so as to be in Chicago, if possible, at the time of this convention, when they will be most cordially welcomed by the Association and invited to attend the sittings of the body and participate in its discussions of papers presented.

Those engineers who cannot conveniently visit the World's Fair at that time, but must choose some other date, are respectfully requested to send their names and addresses, as soon as they arrive in America, to the AMERICAN GAS LIGHT JOURNAL, No. 32 Pine street, New York City, so that a committee from the Association may be made aware of their presence, and when they may be met, so that they may form the acquaintance of their professional brethren in this country and be made to feel less like a "stranger in a strange land."

A. E. BOARDMAN,
President.

A. B. SLATER, JR.,
Secretary.

BRIEFLY TOLD.

MR. SOCRATES NEWMAN, who for many years acted as President of the old St. Louis (Mo.) Gas Light Company, died at his country residence, Ironton, Mo., on the 25th inst.

DEATH OF MR. GEORGE G. PORTER.—It is with sincere sorrow we make announcement of the death of Mr. George G. Porter, President of the Isbell-Porter Company of this city, which sad event occurred without any of those fateful intimations that usually precede or usher grim death. Mr. Porter and his estimable wife were passing their usual summer vacation, this year in the White Mountains, and (on Sunday last) having partaken of a hearty meal, he was seized by an apoplectic stroke, dying almost before those in his immediate presence knew even that he was ill. Through the courtesy of Mr. Charles Isbell, Secretary of the Isbell-Porter Company, we are enabled to place before our readers the following brief sketch of the life of his late business associate and friend:

George G. Porter was born in Skaneateles, Onondaga county, New York, in 1835, and received his education in the Homer (N.Y.) Academy, graduating therefrom about the year 1855. Shortly afterwards he came to New York city and engaged in the drug business, taking service with one Delavergne, whose shop was located at the intersection of Sixth avenue and 14th street. Having acquired a thorough knowledge of the trade, he in due time set up in business on his own account, opening a

drug store at 138 Sixth avenue. He prospered financially, but the shop duties were so confining that his constitution was impaired, and he determined to engage in a business that would afford him employment of a less exacting and restricting nature. Accordingly, in 1871, he secured an interest in the apparatus firm known to the gas world as the Smith & Sayre Manufacturing Company, and was chosen President thereof. When the Isbell-Porter Company succeeded to the business and properties of the Smith & Sayre Manufacturing Company, Mr. Porter was chosen its President, a position that he occupied at the time of his death. So, for a period of at least 35 years, the permanent home of deceased was in New York city. He leaves a widow. The funeral services took place at Skaneateles on the 26th inst., where interment was also made. Deceased was a remarkably even-tempered man, unostentatious, genial and kindly, and much sorrow will be felt by his associates and friends over his final going out from their councils and companionship.

A Pleasant Event.—The Committee of Reception of the American Gas Light Association, appointed for the purpose of smoothing the path of those of our foreign brethren who elect to visit America with the object of visiting the World's Fair, have had an opportunity of accomplishing something practical and in line with their pleasantly fraternal task. Some days ago the Committee were notified of the arrival here of Dr. Hans Bunte, of Karlsruhe, whose connection with German gas affairs is well known, from the fact that concerning these he is a mentor. Besides being the Editor of the German *Journal of Gas Lighting and Water Supply*, he occupies the position of permanent Secretary of the German Association of Gas and Water Engineers, and also fills the chair of Professor of Applied Chemistry in the High School, Karlsruhe. With rare, good tact, Capt. White (the Chairman of the Committee) conceived the plan of getting the Committee in good working order, and of putting the Doctor in the hands of his hosts at the same time, by inviting all to an informal dinner, to be served at the new house of the Lotos Club, on the evening of the 26th. It may be taken for granted that the dinner was an enjoyable one in every sense, and that guest and hosts were entertained and entertaining. Besides the Doctor, the Committee also had as guest Baron von Oechelhaeuser, General Director of the Deutschen Continental Gas Gesselschaft, who has been in this country since May last, at which time it may be remembered he was the guest of the Western Gas Association. Those of the Committee in attendance were: Wm. Henry White, William H. Bradley, Joseph R. Thomas, William R. Beal, Oscar B. Weber and Fred. W. Floyd. Capt. H. R. Tarr, of the Worthington Company, and Col. C. A. White were also present.

The Trials and Tribulations of the Equity Company's Shareholders.—The peculiar tactics that are being pursued by the operating (?) Company that has taken over the property and franchise of the Equity Gas Light Company, from the Construction Company, have caused no little wonder, in that ordinary observers are unable to find cause or commonsense for the masterly inactivity that prevails in the new owners—an inactivity which actually extends to neglect to settle "such trifles" as the payment of interest on the bonded debt and so on. Soon something is likely to be heard "falling with a dull thud," as the following circular, dated New York, July 20th, indicates:

To the Stock and Bondholders of the Equity Gas Light Company for the Eastern District of Brooklyn—Gentlemen: At the request of a number of the stock and bondholders of your Company, the undersigned, who are largely interested in the securities, have consented to act as a stock and bondholders' committee, to represent all interests that choose to deposit their stock and bonds with the committee. On July 1st the present managers of the Company defaulted in the payment of interest, and are now so conducting your affairs as to make it extremely necessary that there should be prompt action on your part to protect your interests and to compel the proper management of the Company by those who are your agents and trustees. In order, therefore, that there may be no delay in instituting such suits and adopting such course of action as shall best preserve and protect your interests, you are requested to forthwith deposit your stock and bonds with the Atlantic Trust Company, No. 39 William street, New York City, subject to an agreement which will be ready for your signature. Against these securities you will receive a negotiable receipt of said Trust Company, which will take the place of the securities pending the litigation, if any shall be necessary.

Communications with the committee may be had by addressing any member of the same in care Equity Gas Works Construction Company, 120 Broadway, New York City.

Carman R. Hetfield,
Frank B. Colton,
John Bentley,
} Committee.

The Benefits to be Derived from the Formation of a Gas Association on the Pacific Coast.

[A Paper read by Mr. J. B. Crockett, of San Francisco, Cal., at the organization meeting of the Pacific Coast Gas Association.]

When the idea first presented itself to my mind of forming the gas men of the Pacific Coast into an Association for their mutual profit and pleasure, I broached the subject to a great many gas men in our immediate neighborhood, and was very frequently met by the question, "What will be the benefit to the gas men on this Coast by forming such an Association?"

The question did not seem to me to be a difficult one to answer, for this reason. We on the Pacific Coast occupy in the gas profession an entirely distinct and separate position from that occupied by the Eastern gas men. Here, for instance, we are entirely removed from the proximity to manufacturing institutions where you can buy your supplies, where you can have an entirely new set of gas works constructed for you, where you can have your station meter built, where you can get your gas pipes of all sorts, and, in fact, every supply which is necessary in the gas business; where, if your station meter gets out of order, it is very easy to send to one of the meter companies and ask them to send a man and repair it for you; where, if any part of your apparatus gives out, there are many factories continually building that class of work that will immediately take it in hand and reconstruct it for you; where, if you have any trouble with your exhauster, it is very easy to apply to the manufacturers of that article, and have them renew the different pieces for you; and where, in fact, everything of that sort going amiss can be very readily and quickly rectified by the people who were the original builders of the apparatus which may be in disorder.

In the Eastern States the cities are so large and so near together, and the gas men are so constantly meeting and interchanging views, and thus being constantly educated, that with them it seems more or less easy to overcome difficulties which would to us seem hard. Here, if any part of our apparatus gets out order it would hardly pay us to send to New York for a man to come out and repair it, because the cost of bringing that man out and sending him back, the delay and the general expense would be so great that we feel we would have to do that work ourselves; therefore, we are thrown more entirely upon our own resources.

Again, if any conditions arise different from the ordinary conditions of manufacturing—if, for instance, you find, which is very seldom found in the State of California, and which until a few years ago was unknown here—napthaline in your street mains, services and meters—how many are there of us who without experience would have been able to handle difficulties of that sort? Then, you find little difficulties arising in many ways, which are new conditions, which have not occurred in your own works before, and which you may successfully cope with, but feel that you would like to have the advice of and benefit by the experience of others.

Another feature is this. We are constantly having brought to us from Australia, from Japan, and from the northern coast, different kinds and qualities of coal, which should be tested both for their gas producing qualities, the yield of residuals, and the impurities contained in the coal, which tests should be made with care, and upon such tests determine the fact whether the coal is a desirable coal to purchase or not.

How many of the small companies will rely entirely upon the tests made by us—for instance, the San Francisco Gas Light Company—and yet not know themselves what that coal will yield; whereas every company should be in a position to make its own test and not be dependent upon us for it. The mere fact of our buying the coal is made use of by dealers who sell it, when the facts may be that from our test from a ton or two of the coal sent us, we may conclude to make a full working test of one cargo, and may find that it runs unevenly and does not meet our requirements at all; but in the meantime, the fact that we have purchased that coal is used as a handle to sell it to other companies who rely on our judgment of it.

I have found in my experience of over 20 years in the gas business that some of the most valuable hints I have received have been from the managers of small gas companies. They have more time to watch the different conditions under which they manufacture their gas, they are removed from other places and are thrown upon their own resources to do certain things. They can try experiments, and they have a great many more opportunities than a man in charge of a large company who has not the time to look into minor details; therefore, these thoughtful men in small companies are able to give us a great many very valuable ideas, still they hesitate more or less to do so from the fact they

think such advice would not be welcome; but if we meet together in an assemblage of this sort, these ideas are brought forward not always in the shape of papers but in the conversations that members have one with the other.

I remember very notably the time that I attended the Savannah meeting of the American Gas Light Association. There I found it difficult more or less to follow the reading of the papers, on account of the noise and confusion which in a way distracted my attention from them, and also because I knew that those papers would be published in the GAS LIGHT JOURNALS, where I could read them and study them over more carefully than I could attend to them when being read; but the chief benefit which I derived from that meeting was the fact that I was brought into contact with men from all parts of the United States, and it was in the ordinary course of conversation with them in regard to their works, their methods of manufacture, their difficulties which had to be met and overcome, that I gained a great deal of information which I could not have gained except in that way.

Now, the purposes of this Association are to promote, not only a greater interest in the gas business and thereby gain more knowledge, but also to bring the members of this Association together in friendly feeling so that they will know one another and that they can ask questions which will educate one another, and in that way be a positive benefit to every member of this Association. The benefit does not entirely lie in the fact that you are going to learn something; it lies also in the fraternal feeling which these meetings engender, and which cannot but be productive of a great deal of good. One particular point which would be of great interest to the gas manfacturer now, and which some of our small contemporaries can enlighten us upon very much, is the question of the electric light. It has been generally conceded throughout the United States that the gas companies operating in large cities had better leave the electric light alone as a part of their business. In the first place, the increase of the population in large cities is great, the extension of the territory is continually going on, and what we lose in the business portions of the town is usually made up by the extensions of the city itself. But in the smaller places the electric light cuts a very important figure; it means that the gas companies are compelled to operate electric light plants in connection with their own business in order to preserve their property; therefore, almost every small city in the State of California or on the Coast has an electric light plant. Almost every manager of one of these gas companies has gotten a better insight into the practical workings of an electric light plant than we who control large companies; therefore, their experience should be val uable not only to the large companies but to the companies operating in the same way.

Again, we hear of a man who has discovered that the pomace of the grape makes a very good gas. As he is living in the grape district, he can buy this pomace for a very small sum comparatively and he buys it and makes gas with it. How many other men are there situated in the same way who could do the same thing if they had the benefit of the experience of our friend mentioned. The question will be asked: "Is it profitable for a small gas company to manufacture water gas?" and whether the fact that they have to leave their generators unused for a large portion of the day, and where the cost of the fuel consumed when the generators are not in operation, would not make it more expensive to them than coal gas. Or a man may say that one of the objections to the manufacture of water gas in his place is that the price received for his coke will compensate for the higher price that he has to pay for his bituminous coal. These are questions replies to which will educate all the small companies on the Coast in a greater or less degree, and which any member of this Association should be able to answer; but these questions are being asked continuously.

I am sure that nobody can doubt that the discussion of these different things will bring up a great deal of information which will be profitable to every member of this Association. Therefore, it seems to me there can be no question, there can be no doubt, of the benefits to be derived from an Association of this sort. If it were not so, would the American Gas Light Association continue in existence for the number of years it has done? Would there have been formed in New England an Association; would the Western Gas Association have taken it up? And now I hope the Pacific Gas Association will come into the ranks and bye and-bye bring forth matters of interest which will be beneficial not only to the gas interests of the Pacific Coast, but to the gas interests of the United States. I am sure that the members of this Association will not be behind in contributing their quota to the gas literature of the country. We know that we have men of brains and intelligence here—men whose views will meet with favor; and I feel confident that after this Association has gotten into full working order, that when the members have become acquainted with one another and do not feel that they are strangers, then they will not feel any hesitation in getting up and questioning the statements made by any member, and drawing out the facts, and that they will begin to work and work with a purpose. The only way that that can be done is to have all of us take an interest in this Association and which I am sure we will take, and let us make our Association equal to any in the country.

Is the Electric Light Friend or Foe to the Interests of Gas Lighting?

[A paper read by Mr. J. L. Hallett, of Portland, Ore., at the organization meeting of the Pacific Coast Gas Association.]

Sixteen years ago electricity as a lighting medium came into such prominence that the gas industries were considerably disturbed, gas stocks tumbled, gas engineers were nervous at the loud predictions and threatened overthrow of gas lighting. Columns of the news journals were filled with the marvelous achievements of the wizard of Menlo Park, in producing electric lights of great brilliancy at such low cost that it must displace gas, and the paper of the largest circulation in New York, gave the gas companies of that city twelve months to close out their business.

There was reason for distrust, as never before had such remarkable results been attained in producing commercial lights of equal brilliancy. Electricity for artificial lighting was not a myth; it came to stay, and we must credit its promoters with untiring effort that has brought it to its present efficiency. Has it advanced or been a hindrance to the gas output? That the newspaper prophecy was unprophetic is evident from the enormous growth of the gas business since 1877. I was led to the selection of this subject from the following inquiry, "What can be done to overcome the decline in output, caused by depression in business and competition?"

Another, "Our town is dead. Shale $30 a ton, oil 17 cents a gallon, and a first class electric outfit," with emphasis on the latter, "to butt against."

A show of hands would probably number a majority if not all of the companies here represented, competitors with the electric light, as the electric machine man finds his way into the smallest towns where there is a shadow of chance to sell his wares.

Local conditions will necessarily affect the growth of the best managed companies, and if the output is less than it was, it would not be fair to assume it due to cause which could be remedied. If the town or camp is dead beyond resuscitation the company cannot afford to lose a single meter, and an electric light plant would be a detriment, but with real live towns, full of vitality and push, towns that must grow to large proportions, better two electric companies than none, with the proviso, that the gas company exhibits as much energy and liberality in the extension of mains as the electric company does in building lines, and sell gas of the best quality, at as low rate as possible, employing the same methods if need be to get and retain customers. Without doubt electricity has done much to promote the interests of gas lighting. The glaring brilliancy of the arc light has created demand for better light, and more of it in the home and place of business, making gas of a high candle power imperative, also general enlargement of the plant, notwithstanding the arc light has superseded gas for street lighting—formerly a large factor in the yearly output.

With this exception, will we admit the superiority of electricity over the vitalized gas of the present day—vitalized, for it is different in kind, purity and intensity in contrast with that produced a few years ago.

Modern appliances, devices and methods of manufacture have developed a nearly perfect illuminant. Before the advent of the electric light, 14 to 16 candle power of sombre orange color was the correct basis of illumination. Now a beautiful white light is made of 18 to 30 candle power. Then 3½ cubic feet per pound of coal was considered a choice result. Now, by improved methods of carbonizing, the yield is 30 to 40 per cent. greater.

Leakage or unaccounted for gas, formerly 15 to 25 per cent., has been much reduced—36 out of 72 companies in Massachussetts reported last year less than 10 per cent.; one company, making 8,500,000 cubic feet, only 2.71 per cent.; another, with an output of 89,000,000, 3.63 per cent.

To what degree we are indebted to the modern light for these improvements it is impossible to estimate. The question is, "Are we keeping up with the procession and meeting competition with the best weapons at our command?" Our competitors are oil and the incandescent electric lamp of 16 candle power, never more, and *less* when the machinery is overloaded, and sometimes no light at all, to the discomfort of the consumer.

The utility and reliability of gas for all purposes is its stronghold, and seldom will a storekeeper using electricity consent to the removal of the meter for protection when the electric lights fail.

In one case where the electric system was introduced through the business part of the town, the electric consumers' meters recorded 75 per cent. as much gas, and there was an increase in the annual sales of 10 per cent, with substantial gains each succeeding year, caused largely by the effects of the blinding arc lights in the public streets.

Complaint is sometimes made that gas bills are more than they used to be, which is true with many. The 2,000 candle power electric lamp is an educator to light, and the consumer alone can control the evolutions of the gas meter. For example, a hotel displaced 40 gas jets in the dining hall, substituting arc lights, and the next month's bill for gas was larger than before. There was no unusual number of guests. The intense brilliancy of the concentrated arc lamps in the brief hour or more devoted to dinner had so disturbed the optics that twice the number of gas jets were lighted in the parlors and sleeping apartments, and the proprietor, seeing the point, sensible man that he was, discarded electricity and returned to gas.

As an educator, electricity surely is a friend to gas lighting. In this city we see electricity vieing with gas in a large number of business stores, a strange and unusual exhibition of profligacy of lighting, and unprejudiced judges must admit that gas outshines them all in intensity and diffusion of light. Having advantages over other means of illumination and domestic use the secret of prosperity lies in producing the best article possible and of uniform quality. Have any fear of losing ground? Would it not be well to note if they are giving the public as good an article and service as their competitor. This may require additional machinery and changes in operating, also looking to the needs of the consumer, service pipes, burners and fixtures, but it would pay, rather than follow antiquated ways, losing custom, and those lost might be regained.

There recently came to my notice a gas plant, built 10 years ago, located in a right smart town, with every evidence of thrift. There were 94 meters and no effort made to get more. The building showed neglect, yards strewn with debris of all sort. There was not the semblance of neatness anywhere. The Superintendent looked tired as did the surroundings. There was a well-worn lounge in the retort house for the tired stoker. Mouthpieces were leaking badly. Yield per pound of coal criminally small. Retorts were loaded irrespective of heat of the bench, with all they could hold once in 12 hours. The Company never paid a dividend, and couldn't allow the Superintendent a large salary under those conditions and pay cost of coal and taxes, so he ran a saw mill, that was strapped on a wagon and hauled about the streets, sawing wood at so much a cord. This paid a dividend while the gas works did not. The electric company were active canvassers, and one by one meters were removed, and it was only a question of time when the Gas Company would go out of business had there not been a change. A Superintendent with business tact was employed, the saw mill was disposed of, and within a brief time 27 new meters were set, displacing many incandescent and 10 arc lamps with a fair outlook of doubling the consumption within a year. This, of course, is presumably an exceptional case.

A few dollars outlay in tracts, and an hour or two daily soliciting, will add 100 customers, double the sales, insure a good salary to the manager and pay fair dividends to the stockholders. Get on the winning side of the public. Through missionary effort much can be done to add to the number of meters.

While we cannot claim the earth, neither should we be indifferent to the appeal of the electric light agent's method of soliciting business. Persons move on to the line of mains who are not weaned from oil and gasoline and are strangers to or prejudiced against illuminating gas. A liberal distribution of tracts upon the advantages of gas for light and fuel might swell the list of consumers.

Is the electric light friend or foe to the interests of gas lighting? Much could be said on this subject. Everything depends on the quality and price of gas sold and considerate management.

On Gas Fittings and their Supply by Gas Undertakings.

[A Paper read by Mr. John Lyne, of Wexford, before the Incorporated Gas Institute, at its Thirtieth Annual General Meeting.]

In the ordinary routine of daily life, it must often be experienced that, of all things, the hardest to bear with patiently are blame and reproach which are undeserved. The manufacturers and vendors of almost all necessaries of modern life have, in the practice of their callings, a hard task to escape the unfair criticism and censure of the customer, and the consequent depreciation of their productions and commodities in the eyes of the public. But they have, as a set off to this, the advantage of learning the precise requirements of the purchaser, and can rely on the fact that the ordinary commercial laws of demand and supply tend surely, if slowly, to bring about an equilibrium between the ideal of perfection demanded and the article actually supplied.

In this respect, there is no large and efficient body of public providers so heavily handicapped as those actively engaged in the manufacture and distribution of gas. Their chief saleable product has, in the public mind, a considerable amount of mystery about it—differing so much in its nature from all other wants; and it is so readily turned into a source of danger and waste when controlled by careless hands, and so easily ill-treated and robbed of much of its value through the medium of bad appliances, that it is indeed small wonder if the chronic opinion of many a consumer is unjust to the gas undertaking. Here it would seem as if the fixed theory of demand and supply proved to be a fallacy. Yet how well known is it to persons who are competent to judge, that, in the great majority of instances, the quality of the gas supplied is not only fully up to the required standard, but frequently beyond it. It may, however, be allowed that, in spite of the gas undertaking's earnest desire to satisfy the wants of the consumer, both as to quality and quantity, it often happens that he has just grounds for complaint, inasmuch as he is naturally unable to discriminate between deficiency of quality and insufficiency of supply; and whenever the quantity falls short and shows a bad result at the burner, he must, in ignorance, condemn the quality. The consumer's demand is really one for better light; and it will be admitted that, in ninety-nine cases out of a hundred, some partial remedy at least lies in improved distribution.

It would not be wise, in such an assembly as this, to raise the possibly contentious point as to whether those who control the internal or external departments of a gas works are more often at fault. But those who, like the writer, have to act in the dual capacity, may be assumed to be practically impartial in the matter, and will no doubt, as a general rule, allow that when there is any genuine need for improvement, it is in the matter of proper distribution. This the writer takes in the broad sense to include complete distribution through all internal fittings and appliances whatsoever, as well as through mains and services. A natural sub-division of this line of distribution would be at the point where the internal and external service may be imagined to meet; and at this point begin many of the most serious obstacles to the general success of a gas undertaking—here at the very point where many managers unwisely consider that all their troubles have practically ceased, and beyond which they have at most to secure the needful registering of every cubic foot that passes through the meter.

The progress of gas from the retort onwards through all the stages of production receives all the care, skill and attention that untiring industry and shrewd common sense can bestow on it. Able men—some passed away, some living—many of whom have made their mark outside their own profession, have brought to bear on it that inventive genius and practical ability which help so much to make gas still outdistance all its competitors, both the old and the new. It is evident that, to keep it in this proud position for the future, those combined efforts of head, heart and hand must not be relaxed; and it is with a view of focussing more general attention upon what he considers one of the weakest spots in an otherwise robust constitution that the writer has ventured this paper.

A bad system of internal house fitting is the arch enemy of every gas undertaking. It discourages consumption; it is a heavy and needless addition to the consumer's expenses; and it keeps customers at war with the gas undertaking, ever promoting strife where the most friendly good feeling is for many obvious reasons absolutely necessary. This matter of internal house-fitting, though a simple subject, is in the writer's opinion deserving of the earnest attention of the members of this Institute; and in putting his views before this meeting, he aims not so much at giving information on things pretty well known, as at eliciting it for the common benefit. He further desires that a decisive note be here sounded on the necessity there is for manufacturers of gas fittings bestowing much more care on details of the articles they make than has usually been done hitherto, so that those who wish for such may have no difficulty in obtaining durable well-finished appliances. The writer treats all as fittings, from the point where the service-pipe terminates within the house to the burner-tip, including even the meter, as it is an indispensable adjunct, and, apart from its duty as a measure, not without its effect on all. He feels somewhat reluctant to go at all into details on what may be considered trivial matters well known to every

member; but he thinks a brief review of essential appliances is necessary.

The main tap, whether charged for or not, is usually supplied by the gas undertaking, and is too frequently an unreliable and short-lived article. To maintain unchanged the shape of the current, it should have a circular gas way, which ought, except perhaps when used for the smaller class of houses, to be of the same diameter as the service-pipe. Unlike most other articles produced by makers of gas-fittings, the writer is glad he can say it is possible to obtain a reliable and durable article of this kind in gun metal—the most suitable material in his opinion—practically as perfect as could be desired, and at a moderate price.

Passing on to the meter; there are two kinds to choose from—the wet and the dry. The writer knows how reliable the former is, from a gas manager's point of view, looking at it merely as a measure, provided the level of the liquid with which it is charged could be properly maintained. He boldly asserts, nevertheless, that a wet meter is a thing not to be tolerated in any house of even moderate size; and it should only be used, if at all, for small consumers. The chief objections to it are well known, such as sudden extinction of lights without any warning, and oscillation caused by evaporated water getting deposited in the pipes—both sources of much annoyance to the gas consumer and to those connected with the supplying of gas. The writer considers it much better on the whole to run the risk of losing, say a little gas, which may occur occasionally, through the use of dry meters. Any possible loss in this way will be more than compensated for by the satisfaction given to consumers, by a saving in the cost of inspection, and a considerable saving in first cost and maintenance. He therefore strongly advocates the use of the dry meter.

For indoor purposes—such as for dwelling houses, shops and public buildings—the writer considers that what is known as composition pipe should alone be used, as it is durable, not liable to corrosion externally or internally, and recommends itself for the rapidity and ease with which it can be laid, and the readiness with which it can be extended, altered or removed. Once done well, it may practically be considered everlasting. In laying such pipe, all jointing should be done with the blow pipe; and no union or brass connection of any kind should be used between the outlet of the meter and the brass screwed ends to which the brackets or pendants are attached. Wherever possible, the rising pipes should be sunk into the walls, and the horizontal pipes laid under flooring boards, and as far as possible parallel to their length. The boards over such pipes should be fastened down with screws. There are places, such as railway platforms, workshops and stores—for which iron pipe will suit best, as being less liable to external injury and easy to suspend or to sustain. The diameters of pipes, as usually advocated for any given maximum consumption and for any given length of supply pipe, are, in the writer's opinion, rather smaller than they should be. More satisfactory results can be obtained with a low pressure than many persons seem to be aware of, if there is an abundant supply up to the very point of consumption, such as a large pipe will give; and in laying down internal services, this combination of large diameters with possible low pressures is one that should not be lost sight of. In recommending the above kind of piping for indoor purposes, the writer is aware that it is not new, and that it has been in use for a long time in many places. He considers it good; but if some members know a better system, he trusts they will take an opportunity of giving the meeting the benefit of their experiences.

It may be asked, what does the gas consumer think of the plan of laying large pipes, and of enlarging pipes laid at some former time but now too small. The writer feels much pleasure in being able to speak most highly of his best friend the gas consumer; and his experience is that consumers are willing to have large pipes laid or smaller pipes enlarged when sufficient care is taken to show them that, from increased consumption or other justifiable cause, it is necessary to do so. And, further, that the consumer always appreciates fair treatment and a desire to meet his wishes and wants; that he will even pay what he considers an excessive gas bill, with very little grumbling, if only convinced that all that was possible to do had been done to ascertain that there was no error.

Before making a few remarks on domestic fittings and appliances, the writer feels that it is right to refer to the striking contrast which exists between the excellence of all ordinary plant required in the various stages of production or initial distribution of gas, and the too general inferiority of internal domestic apparatus used for its consumption. In each case the demand is, of course, primarily responsible for the supply. The gas engineer looks chiefly for a high degree of perfection; and his wants are carefully studied and thoroughly met by the makers of gas plant, to whom the greatest credit is consequently due. The ruling factor, however, which governs the supply of all kinds of internal fittings, seems to be a demand for cheapness.

One would be inclined to say that almost anything is considered good enough for gasfittings; and the real reason for this appears to be due to the fact that such articles are chiefly made for what is known as "the trade," many persons engaged in which do not, and cannot be expected to take such an interest in securing as serviceable articles for their customers as a gas undertaking would, or should, if they had the supplying of them. With "the trade" the selling and fixing, as well as the repairs of fittings, is done for profit alone; while for a gas undertaking this profit would be a mere secondary consideration, the consumption of gas to the best advantage being the end to be attained.

It would be rather too much, in a paper of this kind, to go into all the defects of fittings. It will suffice to enumerate some of them—such as taps and swivels too light, so poorly fitted that very little service causes them to leak; gas ways frequently so small that they will not much more than admit that well known domestic implement, a stocking needle; stops for cocks, so carelessly put in that an inadvertent attempt to turn a tap in the wrong direction suffices to destroy it; pipes often so light and so poorly brazed that they easily crack across or split from end to end; inner tubes of water slide pendants to supply 3 or 5 lights, seldom more than ¼-inch internal diameter; pipes attached to ball joints never more than ⅓ inch diameter outside for 5 light, and less for 3 light pendants; the ball joints themselves too weak where they should be strong, so that they are hardly able to sustain the weight of the pendant; and balance weight chains of an exceedingly weak description. The writer considers that the use of the water slide, and of all other sliding pendants, should be strongly discouraged; as also should the use of brackets with more than one swivel, and of india rubber or other flexible tubes—especially for connecting cooking or heating stoves, except for very temporary purposes. For evident reasons, no easily-fused pipe should be nearer than (say) 2 feet to gas jets supplying stoves with atmospheric burners. Designs of fittings are too often poor, with ornament in the wrong place, and weight of brass where it is worse than useless.

Having attempted to point out some of the too palpable defects of internal gas fitting, it will now be expected of the writer to propose or advocate some practical remedy. This is, of course, suggested by the heading of the paper; and as far as the writer can see, it is the only remedy available. Gas suppliers cannot afford to ignore the fact that they have to act as the vendors of their own product; and that serious and continuous loss must result from the policy of keeping aloof from the customer. The mere fact of a gas works being the only one in a district, is no guarantee that it will enjoy a monopoly of artificial lighting. To arrive at the maximum of success, the relations of producer and consumer should be closer. If every gas undertaking would supply and put up fittings, or even make an earnest beginning in this direction, not necessarily attempting to do all the work of their districts from the outset, a very much needed improvement in all domestic gas appliances would soon be effected. A demand would arise for a better class of fittings all round, to the benefit of the manufacturer, of the consumer, and of the gas undertaking. What a great advantage it would be to the gas consumer to have in his city or town a show room for all kinds of domestic gas appliances; where he would be certain of being received with a *cead mile failte*, and be sure of getting sound advice, needful instruction, and such things as he may require, at moderate prices. Care should, of course, be taken in selecting the stock for such a place; but even with caution in this respect, articles might occasionally find their way into stock which, if they could not be returned to the makers, should rather be broken up for the melting pot than sold to a gas consumer. Even in the selection of burners, globes and accessories great services can be rendered to customers; and how surely will such services have their good effect eventually on the success of the gas undertaking!

A few words may be introduced here on burners, globes, globe holders, etc. The flat flame gas burner is still the one which is used most frequently; and though a decided improvement was introduced about 30 or more years ago, in making the tips of such burners of adamas, steatite, and similar materials, instead of iron or brass, and in making the slits smoother, there has been no very great advance since, except in substituting a flat flame or slit union for globes, instead of the union jet. In the argand burner, and the shades and appliances to be used with it, there has been a very decided step in advance. Not only have high results in the illuminating power been obtained from the gas consumed, but the designs of globes, shades and holders are artistic, beautifully finished, and highly creditable to those who introduced them. The

ordinary globe, with large under opening, was also a most successful innovation; and though globes of this shape are now used almost universally, the manufacturers of fittings still persist in sending out the holders for the old-shaped globes with narrow openings.

The regenerative burner, in respect of increased illuminating power, is, of course, a vast improvement on all that preceded it; but the writer regrets to say that, in his opinion, the average consumer does not care to take the trouble of managing it. No doubt, where specially powerful lights are needed, some will take the necessary pains. He hopes it may be possible to simplify it and produce it at a lower price. A newer burner—the incandescent—is also somewhat troublesome; and, in the writer's opinion, the light is not so free from fluctuation as it might be. If the simple flat flame burner could be improved, so as to give a much higher illuminating power, it would be of great advantage all round. All new burners, regenerative or otherwise, and combinations and adaptations of old ones, should be practically tested in actual nightly use for a sufficient time before being recommended to customers. As to ventilating burners, there is no difficulty in lighting and ventilating by means of gas large rooms and places of public resort; but the ventilating burner which can be easily, cheaply and efficiently applied to the lighting and ventilating of private houses, with rooms of medium size, though it may be coming, has not yet come, as far as the writer is aware.

The writer will say now what perhaps he should have said at the outset, that he does not stand before you as a preacher who takes one course himself and exhorts you to take another. For more than a quarter of a century he has been connected with a gas undertaking that supplies and erects all fittings, and keeps a stock of all appliances required. In the first years he found it rather annoying and distracting, as he had no previous experience in the matter; and he frequently thought of recommending his directors to discontinue the practice, which they would have done had he so advised. He has cause to be glad that he did not take such a step, as he discovered years ago what a very great advantage it was to have not only full control of the sizes of pipes, but a voice in selecting all the appliances, including globes and burners. During all that time, it has been the practice to supply consumers with good burners free of charge, suitable for their requirements, or the districts in which they live.

One of the advantages of this control of pipes, fittings and burners—and no small one—is that gas can be sent out from the works at a lower initial pressure than would otherwise be possible. It is all very well to lay down rules as to sizes of pipes, which may be successfully carried out; but of what avail if the good effects which should follow are counteracted by bad fittings and worse burners? It seems to the writer that a demand for proper appliances can only be created, encouraged and maintained through the medium of the gas undertakings; and thus having practically control of the demand, it will be their fault alone if the supply is not equal to it, and if the resulting advantages are not mutual.

Even the largest gas undertakings have considered it sound policy to supply cooking and heating apparatus to their customers; and they are constantly advising them as to the most suitable kinds, and taking pains to give instructions as to how they can be used to best advantage. The pipes are laid, and the stoves fixed in position almost invariably by their own competent and careful men. As gas used for cooking and heating purposes bears only a small proportion to that used for lighting, so much the more are the appliances for consuming the latter worth all the care and attention that can be bestowed on them.

Application of the Intense Heat of Gas to the Superficial Transmutation of Metals.

We are indebted to Mr. A. Bandsept, of Brussels, for the following, which was originally printed in the columns of the *Journal of Gas Lighting:*

The process invented by Mr. A. Bandsept, of Brussels, for the coating of metals is already known. It is based upon the mechanical pulverization of the impregnating materials, which are drawn, by means of a jet of compressed gas, on to the surfaces, raised to a high temperature, the physical properties of which it is intended to transform. Last June an improvement was effected in the process; the object being still the exterior *transmutation* of the metals, but with this particularity—that the jet of gas employed caused the heating of the surfaces at the same time that it drew forward the gas-borne substances intended for impregnation. When these are sensitive to heat, they can be decomposed by this agent at the precise moment when their incorporation takes place; so that by this incorporation they may have undergone industrial transformation. A metallic weft being given, it is possible, by this physico chemical method, to completely change its substance; so that, after the operation, it will have an absolutely new texture, possessing properties entirely different from those which formerly existed.

Very intense heats are indispensable to the success of operations of this kind, as the surfaces to be transformed should take instantaneously the temperature of the flame, and become cool as rapidly, in order that conduction should not have time to produce its effects in the mass of the metal. In order to develop a very intense heat, it is absolutely necessary to realize the conditions essential to perfect and complete combustion, which besides conduces to a more useful yield. The gaseous state fulfils these conditions better than any other, inasmuch as it permits of the intimate mixture of the supporter of combustion with the combustible, and of the perfect regulation of the proportions required for total chemical combination. In fact, effective combustion, for an industrial purpose, is a question rather more of air than of gas; as, for a given quantity of fuel, there is no other control than that which is derived from the supply of air. Moreover, as the direct effect of the union of carbon with oxygen consists in the formation of carbonic acid, it is towards this result that effort should be directed whenever it is desired to produce heat economically. The appearance of carbonic oxide, even as an intermediary compound, is always accompanied by an important loss of heat. Further, as the carbon does not combine entirely with the oxygen, except when the latter is in excess, and the affinity of the hydrogen for the oxygen being greater than that of the carbon, it may happen, in certain cases, that the whole of the first element unites with the oxygen, while part of the carbon escapes the reaction. This occurs even when the oxygen is present in sufficient quantity to saturate the combustible.

Incomplete combustion is the great evil against which we have to contend in practice; and up to now it has only been in the laboratory that anything approaching rational combustion has been effected. This imperfection in application results solely from the little care bestowed upon the composition of the combustible mixtures, the power of which is sought to be utilized. The only way to ensure the perfect utilization of a gaseous combustible is to mix it intimately with oxygen or atmospheric air. The composition of this mixture is a matter of the highest importance; it is only by making it beforehand that it is possible to succeed in so exactly proportioning the air or the oxygen as to realize the conditions of the process either of explosion or of silent combustion. By acting in any other way, we run the risk of excess.

Now, every variation in the quantities of gas and air indispensable to rational combustion appears in a corresponding reduction of the heat set free. When the supporter is in excess, the heat of combination is reduced, owing to the quantity of inert gas which enters into the reaction, and is heated up at its cost. Hence the necessity for having a mixture well proportioned, intimate, and ready in advance for utilization, for any purpose.

The mixture should be exactly proportioned and intimate; and the combustible should be in a state of division and of purity sufficient to facilitate the absorption of the quantity of oxygen required for saturation. In this manner is determined *the greatest number of elementary reactions in a given space and time.* By forcibly reducing the distance of the molecules of the gaseous bodies in presence, it is possible, as M. Bandsept explains, to compel them to move in each other's sphere of action, and by thus increasing the number of points of contact in the mixture produced, to change relative cohesion into a chemical one, much closer. When the critical point of such mixture is near attainment, there is established an equilibrium between the attractive power of the elements and their vibratory state, which assures to the compound a permanent stability, permitting of its employment under the most favorable conditions, either on the spot or at a distance. The chemical affinity of the elements thus reunited opposes itself to the effects of the different specific gravities of these elements. There is consequently no fear of the gases which are thus diffused one in the other having a tendency to ultimately separate. The intimate association of the combustible and the supporter, effected by natural selection, brings about absolute reactions, which set in operation the greater part of the molecular forces stored up in the elements in presence. The essential and determinating conditions of perfect combustion are, therefore, the immediate and necessary consequences one of the other—an interesting feature which heightens the importance attaching to each of them.

The new method which substitutes molecular actions for the effects of mass, to which the ordinary heating processes are confined (even those which characterize the employment of liquid and solid combustibles broken up by pulverization, and injected with a jet of gas or steam as the carrier), lead to much better results than those with which we have

had to be satisfied up to now. In fact, with the mixture previously prepared, exactly proportioned, and emitted under pressure, the whole of the elements of the gases in presence enter almost instantaneously into combination ; while, in the usual systems of heating, the combustion is retarded, because the mingling is only effected gradually. Thus with the rational process the tension of dissociation is raised, which permits of the recuperation, in a certain measure, of the difference found between theory and experience—about 700° C. for gas burnt with cold air. It is probable that, in the case now under consideration, dissociation follows on the inert element of the air ; each atom of combustible, at once, finding its equivalent with which it combines. The highest temperatures readily obtained, in practice, have rarely exceeded from 1,200° C. to 1,500° C. up to now; while with the prior admixture, intimate and well proportioned, they reach 2,000° C. to 2,200° C. Naturally the yields are better in proportion to the elevation of the temperatures ; and though in this class of researches the *a priori* data cannot be formulated with precision, we can estimate that, in the greater number of cases, these yields exceed by from 15 to 35 per cent. those ordinarily established for industrial applications of heat. Everywhere the insufficiency of the calorific output is manifest ; but there is nothing astonishing in this, when we take into consideration the defects of the methods actually in use. The enormous difference between the effective yields and the absolute values of the energies put into operation must be attributed to the fact that the means at our disposal differ completely from the natural process. This requires a multiplicity of profound reactions brought about by the small elements called into activity, while we confine ourselves in most cases to effects of mass, which, as such, limit themselves to imperfect contacts.

The intense heat employed in the transmutation of metals may be engendered in different ways. To prepare the combustible, use is made of dynamic and static mixers, working separately or in combination, according to the degree of perfection to which it is sought to arrive in the composition of the mixture. The former are generally pumps, ventilators, or other machines capable of delivering the gas and air in definite proportions. They may also be constituted by combinations following the principle of the injector, and may act by the lateral indrawing of one of the fluids, and its subsequent pulverization by the initial jet. The static mixers are for the most part based upon the progressive division of the gaseous masses, compelled to circulate through baffle plates of perforated metal in sufficient number to complete the mixture furnished by the dynamic appliances. Under every condition the mixture should submit to three effects—viz , superficial shock by volumes, multiple friction by jets or small streams, and molecular lamination—all determined by its draught into, and its passage through, the comminglers. By means of this mechanical trituration, the combustible mixture becomes so perfect (so uniform in its entire gaseous mass) that it supports, without inconvenience, very great compression, which may be followed by prolonged storing—an important advantage which allows of its conservation and its transport, so that it may be employed whenever and wherever determined. In fact, the gases are so diffused that they exist as a permanent mixture, somewhat like the one found by suddenly refrigerating the elements of partial dissociation—even after combination has been effected, and when time is wanting for their recombination.

In the accompanying illustration (Fig. 1) is shown a simple method of making the mixture of the elements intended to enter into combination. It consists in arranging in zigzag order, along the interior wall of a cylinder open at either end, a series of slit burners supplied with ordinary illuminating gas under pressure. The jets, starting from the same transverse section of the cylinder, and being thrown forward with force, meet each other, and spread out in a layer, through which the air drawn into the cylinder is obliged to make a passage for itself ; the result being the mixture of the gas and the air. Under this form, the obstacle may be renewed as frequently as is required to render the mixture intimate, on condition that the air is driven forward with sufficient force to traverse the cylinder for its entire length. As the latter opens into a pipe of comparatively small diameter, the composite gas meets with a certain resistance by passing outside ; so that, for each ring separating two consecutive ranges of burners, there are produced two actions in a contrary direction. The gas, projected in the direction of the axis of the cylinder, gradually approaches the circumference, at the same time undergoing successive expansions, favorable to its saturation by the air, which enters in the opposite direction. The degree of division of the combustible, and intimacy of the mixture, depend upon the intensity of the gaseous jets, and upon the speed at which the air in the conduit moves. The ultimate combination is in ratio to the work applied and stored up during trituration. When the projecting force of the gas jets becomes very great, and the current of air acquires considerable speed, there ensues a partial dislocation of the hydrocarbure between the elements of which the oxygen penetrates so much the more easily. This circumstance thus contributes to render their mixture more complete.

Other arrangements, having in view the commingling of gas and air, may be made. For example, the receptacle intended for the mixing operation may, as shown in Fig. 2, have upon its lower part emission holes, by which the gas is caused to project itself against jets of air forced in by centrifugal pulverizers fixed in the upper portion of the re-

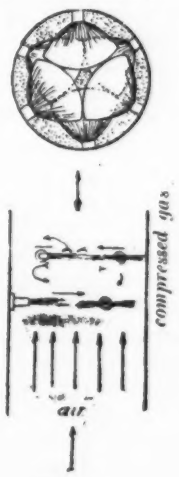


Fig. 1.

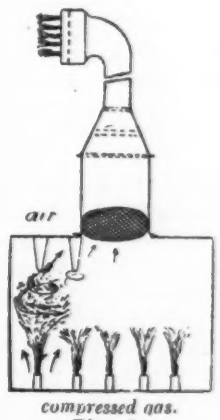


Fig. 2.

ceptacle. The gaseous molecules, disseminated by the shock, are very soon drawn into an aeriform vortex, and end by participating therein. As it is here a question of an induced movement, the two gyratory currents flow in opposite directions ; so that the system fulfills one more of the principal conditions required for a methodical mixture.

The canalization and utilization of the combustible mixture are effected, with perfect safety, according to the principle of the absorbent power of wire gauze—that is to say, by interposing, at certain points over the entire length of pipe, pieces of gauze of close mesh, plates containing numbers of small perforations, etc., superposed in sufficient quantity to prevent any deflagration extending behind the burners. Besides, the latter are constructed upon the same principles ; and in regard to arrangement, they may take the form of injectors with variable jets, or that of the blowpipes ordinarily employed in industrial operations. The essential thing is to concentrate the furnace in as confined a space as possible, in order to develop the maximum amount of calorific intensity at the very points where it is desired to collect the effects of combustion. It is just the opposite of what one is led to do in ordinary applications, in which it is a good precaution to develop flame, in order to hasten combustion. By this it will be seen how defective are the conditions under which one generally works.

In the manipulation of intense heat the flames could not be turned back towards the canalization, unless the pressure under which the composite fluid is emitted were cut off. But even then they would be very speedily extinguished, since rational combustion yields as a product only inert gases. The intense heat resulting from complete combustion gives rise to a curious phenomenon, which Mr. Bandsept calls "inverse convection." The products, being heavier than they are under ordinary circumstances, do not take an upward direction ; and the equilibrium in the mass is established by isothermic layers, superposed in an order different from that which the law of least resistance assigns to active gases generated from imperfect combustion.

As specified at the beginning, the jets of intense gas, led under pressure, bring up to the point of ignition the surfaces to be transformed, at the same time that they carry along the substances, in a condition of extreme pulverization, with which it is desired to impregnate the metal. Only the upper surfaces of the latter are penetrated by the heat, which is communicated in so short a time, and with so great intensity, that the calorific movement is powerless to reach the lower layers. It exerts itself by preference upon the exterior, where it encounters less resistance, and where it constitutes an active zone (of scarcely a few tenths of a millimeter), upon which the gasified elements, carried forward with extreme rapidity, act by shock, as hard and solid bodies would do. These elements embed themselves in the molecular interstices which the heat has momentarily distended, and become incorporated with the surface the instant it returns to its normal temperature—the pores of the metal contracting. Now, this latter phase of the action is of very short duration, seeing the small quantity of metal which has been subjected to the heating operation.

Instead of projecting the impregnating material—welding them eventually in their passage from the injector to the surface of the metal—one can still apply to it beforehand a thin coating, an impalpable layer of the body with which it is desired to cover the metal, and which is fixed upon the latter by means of the burning jet of intense gas. The same phenomena are reproduced as previously; that is to say, the heat is confined to the surface—the conductivity of the metal not having time to come into play in the very short interval which suffices, in intense combustion, to impress upon the outer molecular layers the receptive capacity necessary for incorporation. The attack made by these intense heats enables us to reach directly the bodies of which we desire to modify the physical properties, even when they are at a relatively low temperature. Treated by the method of rational combustion, the surfaces very quickly acquire the temperature of the flame, without this having to suffer destruction of such a nature as to prevent the continuity of its effects, or interfere with the benefits resulting from regular and continuous action.

The superficial transmutation of metals—that is to say, the modification *ad hoc* of some of their physical properties—appears to be called to play a very important part in a great number of industrial applications. More often than not, the materials at our disposal fulfill in only a very incomplete manner the conditions—frequently opposite—necessary to arrive at the solution of certain problems in the domain of practice. In general, the texture of metals does not possess the qualities required for their surface; and in many cases the necessity for coating them will make itself strongly felt. What value should we not attach to the absolute conservation of works of art, to the preservation of the hulls of vessels, etc., if these results could be obtained by simple and economical means? On the other hand, in a number of industrial applications there would be a distinct gain by annihilating certain defects; for example, conductivity, absorption or radiation of heat, occlusion and capillarity, etc.—all actions which we are compelled to counteract by means of more or less ingenious artifices, but the employment whereof always entails additional expense, and leads to inconvenience from the point of view of utilization.

The principles of the superficial transmutation of metals are, briefly, the rapid heating of the surfaces under the action of very high temperatures, in such a way as to dilate only the uppermost atomic layers, and the quite as sudden cooling which naturally ensues. Between these two phases, which are of very short duration, is effected the incorporation of the substances which are to serve as the coating. The transmutation results, therefore, from two combined effects, as Mr. Bandsept says—viz., *molecular adherence* (of the coating material) and *superficial tempering*. Now, in certain cases we can confine ourselves to the latter result, so that the tempering becomes an operation carried out by the good regulation of the temperatures brought into use. This direct treatment furnishes results quite as marked as the electrolytic process recently discovered in Belgium, and an account of which was given in a "Note" addressed to the Academy, and which, moreover, is a process of high scientific importance. According to Mr. Bandsept's theory, the very high temperature obtained from the rational combustion of gas, applied to the metal, produces a sort of atomic pulsation at its surface. As in reciprocal action occurring in every natural phenomenon, one of the phases divides itself into a far larger number of so much more minute particles as the intensity of the double action is greater in a given space of time.

The Torsion Viscosimeter.

By Mr. O. S. Doolittle.

The viscosity of an oil is recognized to-day by both the producer and consumer as the most valuable measure of its lubricating power, and yet we find no uniformity whatever in the manner of determining this essential property.

There are numerous viscosimeters in use, but no one of them has commended itself to the trade sufficiently to be adopted as a standard.

Many of them have their good features, but all have objections which have prevented any one from being accepted as standard and universally used.

The essentials of a good viscosimeter are:

(1) Accuracy, including both the ability to duplicate results obtained with an oil on the same instrument, and also on different instruments of the same make.

(2) Ease and rapidity of cleaning and manipulating, and the reducing of personal error to a minimum.

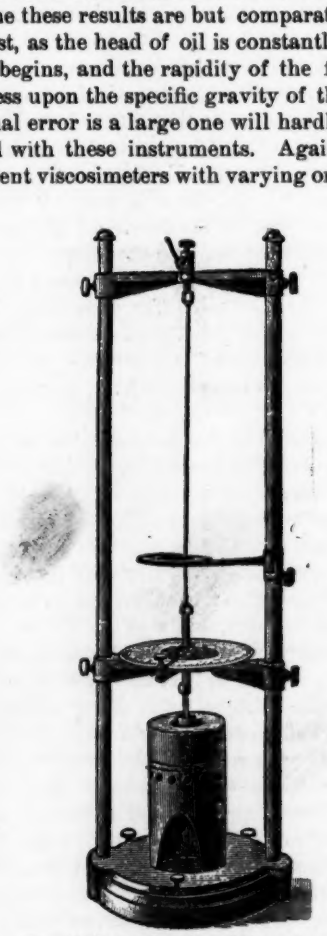
(3) Adaptability of a single instrument to all kinds of oil at all desirable temperatures.

The great majority of viscosimeters are built on the principle of allowing the oil to flow through an orifice and counting the number of seconds required for a certain quantity to flow out. Instruments constructed on this plan cannot be made to conform satisfactorily to all the above requirements.

As a rule, it takes more time to clean and get the viscosimeters of this class ready for a test, than for the test itself. If the instrument is made with great care good duplicate results can be obtained with a perfectly clean oil, but if by any chance a slight particle of dirt gets into the oil the orifice is liable to become obstructed and the results vitiated.

At the same time these results are but comparative, and poorly comparative at the best, as the head of oil is constantly changing from the moment the flow begins, and the rapidity of the flow must necessarily depend more or less upon the specific gravity of the oil.

That the personal error is a large one will hardly be disputed by any who have worked with these instruments. Again, you will find as a rule several different viscosimeters with varying orifices required for the



Doolittle's Torsion Viscosimeter.

different oils, a small hole being the best for light oils and a large one for the heavy products.

Thus we have no regular scale of viscosities ranging upward from some recognized zero point, which, by the way, water furnishes admirably.

This is a most unfortunate state of affairs, as it deprives us of a standard by which the value of all oils could be readily recognized and intelligently understood. When we speak of a temperature of 212° it is well understood, because the Fahrenheit thermometer is recognized as a standard in this country, but when we refer to a viscosity of 125 seconds it has no meaning whatever, unless it is accompanied by the name of the instrument on which it was obtained, and oftentimes the name of the observer as well, thus necessitating the carrying in mind of the ratio of numerous instruments to each other, a very perplexing and unsatisfactory task.

Having experimented with a number of these viscosimeters in the laboratory of the Philadelphia and Reading Railroad, we found them so very unsatisfactory where rapid and accurate work is required that we abandoned them all and designed an instrument on an old principle which has been used in measuring almost everything from a delicate electrical current to the quantity of cream in milk, an operation at times requiring a still more sensitive instrument, *i. e.*, that of the torsion balance.

The principle has not failed us in this case, and in the torsion viscosimeter we have an instrument which, during the year we have had it in daily use, has proved itself reliable, accurate and satisfactory in every way.

It is very easy to clean and manipulate, is adapted to oils of all ranges

of viscosity, from kerosene up, and reduces the personal error to a minimum.

A glance at the cut will show how the principle has been applied.

A steel wire is suspended from a firm support and fastened to a stem which passes through a graduated horizontal disk, thus allowing us to measure accurately the torsion of the wire. The disk is adjusted so that the index point reads exactly zero, thus showing that there is no torsion in the wire.

A cylinder 2 inches long by 1½ inches in diameter, having a slender stem by which to suspend it, is then immersed in the oil and fastened by a thumb screw on the lower part of the stem to the disk. The oil is surrounded by a bath of water or paraffine wax according to the temperature at which it is desired to take the viscosity. This temperature being obtained, while the disk is resting on its supports, the wire is twisted 360° by means of the knob at the top. The disk being released, the cylinder rotates in the oil by virtue of the torsion of the wire.

The action now observed is identical with that of the pendulum.

If there was no resistance to be overcome, the disk would revolve back to zero, and the momentum thus acquired would carry it to 360° in the opposite direction. What we find is that the resistance of the oil to the rotation of the cylinder causes the revolution to fall short of 360°, and that the greater the viscosity of the oil the greater will be the resistance, and hence the retardation. We find this retardation to be a very delicate measure of the viscosity of an oil.

There are a number of ways in which this viscosity may be expressed, but the simplest we have found to be directly in the number of degrees of retardation between the first and second complete arcs covered by our pendulum. For example, suppose we twist the wire 360° and release the disk so that rotation begins. In order to obtain an absolute reading to start from, which shall be independent of any slight error in adjustment, we ignore the fact that we have started from 360°, and take as our first reading the end of the first swing. Suppose our readings are as follows:

Right, 350; left, 338; right, 328, and keeping in mind the vibrations of the simple pendulum we will see at once that we have read two complete arcs whose difference is 22° computed as follows:

1st arc, Right 350° + Left 338° = 688°
2d arc, Left 338° + Right 328° = 666°

22° retardation.

In order to secure freedom from error we take two tests—one by rotating the wire to the right, and the second to the left. If the instrument is in exact adjustment these two results will be the same, but if it is slightly out, the mean of the two readings will be the correct reading.

It will also be noticed that if the exact retardation due to the oil alone is to be obtained, we must subtract the factor for the resistance due to the air and the wire itself. These are readily obtained by allowing the cylinder to rotate in the air and determining the retardation exactly as we have done above. This factor remains constant for each instrument and is simply deducted from all results obtained. The torsion viscosimeter is free from many of the objections noticed in other instruments, and has given entire satisfaction during the period it has been in use. It is independent of the gravity of the oil and of any reasonable amount of dirt which may get into it. It is applicable to all grades of oil, regardless of their character or fluidity. The viscosity of an oil can be taken at any temperature as many times as may be desired without any inconvenience from being obliged to handle the hot oil.

This, I think, is an important point, as the practice in common use of determining the viscosity of a cylinder stock at 212° F. does not tell us what we want to know. We should know the viscosity of an oil at the temperature at which it is to be used, which, in the case of cylinder stock, is in the neighborhood of 350°. I have repeatedly found oils tested at 212° simply reversing their comparative values when heated to 350°.

We need a viscosimeter with which the viscosity can readily be determined at a high temperature with a minimum amount of trouble. By means of a paraffine bath for our oil we have no trouble whatever in doing this with the torsion viscosimeter.

When one oil has been tested sufficiently the cylinder can be taken out in a moment, wiped off, and is then ready for another oil.

The necessity of a standard instrument which shall be recognized by the trade as such cannot be too forcibly emphasized, as the present state of affairs is most annoying to both producer and consumer, leading as it so often does to misunderstanding and financial loss.

The torsion viscosimeter is the standard instrument of the Philadelphia and Reading Railroad, but this simply means that it is the best we know of at present. We are, however, always open to conviction, and if any better method of determining the viscosity of an oil is invented we will be very glad to adopt it.

Peat as Fuel.

In Denmark the peat bogs extend over 90 square miles (English measure), or about four per cent. of the entire area. There is no demand for the peat except for local consumption. At Silkeborg and Moseland a good deal of money has been spent in trying to bring it into use on a larger scale, but so far without success. It is either cut and dried in the air without further treatment, in which case it is called skoretorv, or is kneaded into a more or less homogeneous mass and then cut into blocks called oltetorv. In neither case does it pay to transport it to any distance. Some time ago an attempt was made to heat railroad carriages with peat, and a considerable force of men was employed by the Aalborg Mosstroelsefabrik at Lundergaard Mose, north of the Limfjord. But it came to naught and steam was substituted.

In France a small quantity of peat is cut in the districts of Brest, Cherbourg and Marseilles, but nothing to speak of, although it is sold in Lyons for domestic purposes. There are peat bogs in the Southwestern part of France, as in the district of Bordeaux, but only a local demand is supplied. Even in Charente, where formerly the industry was of some importance, the annual production is now only about 7,000 tons. There is a company at No. 8 Rue St. Martin, Paris, founded by M. Beraud, for making articles from peat fiber. It is claimed that briquettes can be made for 50 per cent. of the cost of coal dust briquettes.

The peat industry of Germany maintains about the same position from year to year, but the consumption is for the most part local. Very little is transported by rail, even for 20 miles, as the rate is about $2.25 per 9,600 sods for 10 miles. In the Grand Duchy of Oldenburg about 150,000 tons yearly are used, in brick kilns, bakeries, etc. The method of peat cutting used at Carolinenhorst is about the same as that of other districts. The peat is cut by three men, the first cutting from the top with a sharp square ended spade, the second from the side with a round-ended spade, dividing the turf into lengths also. This second man sometimes uses a three-sided square-ended spade shaped like a parallelogram with one of the long sides lacking. The third man lifts out the sods with a four-pronged fork, having the tines turned up at an angle of 45°. The depth to which the peat is cut varies from 9 to 15 feet, the whole of it being used except some three or four inches of the top. Machine cutting has been tried, but was not found to be any cheaper than hand labor. The best is in the undermost layers, the first three or four feet being used for moss litter. The cutting takes place in the spring, and the drying goes on until August. All of the peat is air-dried, the drying apparatus of Rottbarth, at Gifhorn, not having been a success. For air-drying, the peat is stacked by women in piles 6 feet long, 3 feet wide and 6 feet high, the sods not being laid close together, but overlapping, so as to give free access of air. Each pile holds three cubic meters of peat, or 1,200 sods, and, when dry, is called "klaster." The dried peat is divided into three classes. 1st. The dark peat coming from the lowermost layers, being heavier than the other kinds, and affording so little ash that 15 sods, measuring when fresh 13×10×10 inches, yield only a large wineglassful. 2d. The peat lighter in color and of less weight. 3d. The peat from the top layers, less valuable than the other two sorts.

The peat exported from Germany during the last few years was as follows: 1888, 11,184 tons to foreign countries; 1889, 12,056 tons; 1890, 11,819 tons; 1891, 11,457 tons, all to foreign countries.

Switzerland takes most of the foreign exports. The imports into Germany are slightly in excess of the foreign exports, being 13,073 tons in 1891.

Peat fuel has found its greatest development in the Netherlands, where about 280,000 tons are annually used in the brick-kilns, and have a value of $665,000. It is estimated that the value of an acre of good black peat, well situated, is about $400. Along the rivers Maas, Waal, Linge, Lek and Yssel, black peat is almost exclusively used in the brick kilns. The peat has to be cut and stacked and dried before it can freeze, as when once it has been frozen it losses a great deal of its heating power. In Holland peat is made into charcoal, which has about the same heating effect as wood charcoal, but being more porous and carrying more ash it is not so much in demand. The sods are air-dried, and then converted into charcoal either in heaps or ovens.

Of all the European countries Russia has by far the greatest extent of peat bogs, as they cover an area of some 67,000 square miles and are capable of yielding 14 milliards of tons. The peat bogs of the crown lands in the provinces of Petersburg, Moscow, Orel, Riazan, Vladimir, Tamboff, and along the Kursk-Kieff line are said to contain 100,000,000

cubic feet of excellent peat. In Norway and Sweden the utilization of peat is progressing faster than in any other country. It is employed as a fuel by glassworks, brick kilns, wood pulp factories, under steam boilers and by metallurgical establishments. For the last-named purpose alone the annual consumption is about 30,000 tons. The peat bogs of Sweden cover an immense area in Delacarlia, Vermland, Smaland, Halland, and North Scania. In Upper Noorland also and in Lapland there are large areas of peat deposits. The waste gases from certain iron works are used for drying the peat, locally, and by this treatment there is a gain in heating power of 20 to 30 per cent. The cost of making good peat fuel in Sweden may vary from $1.08 to $1.35 per ton. It is expected to contain from 30 to 40 per cent. of combustible matter, with from 7 to 10 per cent. of water.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, July 10, 1893.

General Prospects.—The Gas Institute at Belfast.—A Hiring Case.—Leakage of Electricity.

The weather during the six months just closed has not been favorable to the sellers of gas. We have experienced an unprecedented run of fine weather during the whole of April, May and June, and such an unusually large allowance of sunshine has increased the hours of daylight beyond the normal number, shortening the evenings and the hours of maximum demand for lighting purposes. Furtunately it happens that gas undertakings are not entirely dependent upon a demand for light. Where such is the case, as with the electric lighting undertakings, the effect cannot but be serious, as the loss of 20 or 30 minutes maximum supply on each evening means the loss of a considerable slice of the whole. For gas companies there is some compensating advantage. The fine weather means increased heat, and with light and warmth everywhere, there comes a greater inclination to appreciate the advantages that can be secured by the adoption of a gas cooking stove as a permanent member of that important household department which comes under the domain of the cook. In tailors' rooms, carpenters' workshops and many other places, the fact that a little stove or ring burner on the hob is more endurable than red hot glowing coals in the grate, is rendered very prominent by the demand for some means for keeping the place cool. So the hot weather means more activity in the placing out of gas stoves. If it leads to a falling off in the evenings, it brings a larger day consumption, and often it is found that the increased demand during the hours of daylight is sufficient to keep up the average 24 hours consumption to its normal state. The fine, dry weather also has its effects upon the coke heaps, many of which are increasing more rapidly than would be wished. The coke trade ebbs and flows in a manner that at best can only be partially explained. Sometimes stocks decrease and disappear altogether, and at other times they grow and accumulate in a way that is unaccountable, and at present is decidedly low tide with the coke. There is one thing influencing it, to which gas people will not object, and that is the state of the coal market. The artificial inflation of the prices of gas coals, which was maintained during last year with fair success, appears to have suffered a total collapse. In the summer of '92 there was a heavy fall in house and steam coal, and it was then urged by friends of the coal trade, that gas and railway companies must have coal, and that every endeavor should be made in the way of preventing them from enjoying the full benefits of the decreased prices. Only a comparatively slight reduction in the prices of gas coals was the result, but now they can be obtained at rates fairly proportioned to that prevailing for other kinds of coals. It is impossible to say how far the attention that has been directed to water gas, the use of oil for enriching, and other methods that lend to diminish the consumption of gas coal, has had any effect in bringing about this state of affairs. But it is a significant fact that the introduction of a water gas plant to make 2 or 5 or 12 million cubic feet of gas per diem, as the case may be, means a reduction in the consumption of gas coal to the extent of 200, 500 or 1200 tons per day. However that may be, contracts are now being placed at about 10 per cent. below last year's prices. Turning to sulphate, the market for that residual is in a state of activity that has not been equalled for years past, and it bids fair to be maintained throughout the remainder of the summer. So that on the whole the outlook for gascompanies is decidedly satisfactory.

The Gas Institute held a very successful meeting at Belfast last month, under the Presidency of Mr. Denny Lane, of Cork. Notwithstanding the inconvenient locality in a geographical sense—for it is as tedious an affair to get to this beautiful Irish district, from the south or midland parts of England, as to take a journey to the Alps—there was a large attendance. The whole of the proceedings, including a lengthy list of applicants for membership, show that the vitality of the Institute is as strong as ever it was. The Institute has reason to be proud of its Presidents, but is not dependent upon their brilliant abilities for its existence, as the real strength lies in the steady and loyal support accorded to it by the 600 rank and file of the members. Mr. Denny Lane is so well known that I need scarcely observe that his Presidential address was a masterpiece. The principal papers read will no doubt be reproduced for the benefit of your readers, so I may avoid the temptation to enlarge upon them, and will not do more than remark that in respect to new suggestions, and a decided advance upon the position already attained in respect to the various topics treated in them, the meeting was equal to any of its predecessors. Unfortunately the length of the journey prevented the writer, as it did many others who have important works in hand, from sharing in the pleasure of supporting Mr. Lane, on his native soil, or in the social and other enjoyments that had been so carefully arranged and provided for. The efforts of Mr. Stelfox, Manager of the Belfast gas works, are especially worthy of recognition.

A case that recently came before the Sheffield County Court possesses some instructive as well as amusing features. The gas company sued a consumer for arrears due on rent of a stove, which had been supplied on hire, but lost sight of for eight years. During this period the party concerned had held uninterrupted possession of the appliance, and he now urged that the Statute of Limitations, which provides that a debt lapses and cannot be sued for at a period longer than seven years after it was incurred, protected him from liability, and he refused either to pay the claim or give up the stove. But the court decided against him on the ground that the rent became due quarterly, and that it was his duty to tender the same, without awaiting application. So the claim was ordered to be paid. The case is of importance to all who let goods on hire, although customers who would resort to such a means of evading payment are rare. On the other hand, it shows the importance of keeping a sharp lookout upon property let on hire. The explanation offered by the Gas Company was that they lost sight of the gas stove by reason of changes of address on the part of the defendant, and only discovered it by accident. Considering the extent to which the hiring out of gas appliances is now carried, legal cases arising therefrom are remarkably rare, though probably no one goes into the hiring business on a respectable scale without encountering one or two disreputable pieces of sharp practice. One often hears of pianos or furniture, supplied on hire, being fraudulently disposed of by the hirer. But perhaps gas stoves are not so easily converted into cash.

The effects of that well-known phenomena, which for all practical purposes may be regarded as leakage of electricity upon gas pipes, water pipes and long runs of metal work in general, have attracted attention here, and a Parliamentary Committee is now engaged in taking evidence on the subject, with a view of inserting such protective clauses as may be found to be necessary in all Acts of Parliament granting powers for the supply of electricity. The prospect of danger to the public from this source is not one to be lightly treated. Our chief towns are closely honeycombed with metallic conduits of many kinds, of which those for the conveyance of water, gas and high-pressure power may be instanced; there are also pneumatic communication tubes, electric telegraph wires, iron girders, bridges and aqueducts; there are numerous lines of railway, with telegraph wires and other accessories. All of these are liable to injury from electrolysis. If the matter stopped here, it would merely be a question for the owners of the property concerned. But it also happens that these conduits may be converted into huge electric conductors, gathering electricity at one place and delivering it at another, regardless of convenience or safety. So that it may be conducted into houses, amongst inflammable materials, and to all sorts of places where its presence may result in terrible catastrophes. The escape of gas, water or high-pressure steam means a great deal more than loss to the suppliers of the same, and in this connection it must be remembered that sewers, tunnels and subways afford facility for the accumulation of explosive gaseous mixtures.

The various parties interested are represented at the inquiry by counsel, and the Committee are also collecting independent evidence from government officials, as representing the safety of the public. So it may be expected that this inquiry will add materially to our knowledge of this important subject. Major Cardew, the electric adviser to the Board of Trade, was one of the independent witnesses examined, and he proved the actual occurrence of accidents and injury to property by the escape of electricity, producing samples of pipes, etc. He considered that the accidents were not unavoidable risks, but that they were chiefly due to

carrying out the electric installation in a hurried and faulty way. So it would be possible to avoid them by properly carrying out protective regulations. Precautions were especially necessary in the case of tramways worked with uninsulated returns, but he suggested means by which injury from corrosion, if it occurred at all, could be confined to their own rails.

Sir F. Branwell said that with properly laid electric lighting systems, leakage could only occur by accident, but in the case of tramways working with uninsulated returns, there was a constant liability and risk of danger. He advised proper insulation of all electric conducting lines, whether positive or negative, and this recommendation was supported by Dr. Hopkinson and Prof. Dewar. The legal representatives of the railway, gas and water companies pressed for the adoption of a clause enforcing perfect insulation as advised by the experts, not specially for the protection of their property, but for the general safety of the public. The decision of the Committee is not yet announced.

The Day Load Problem in Electric Lighting Plants.

The question of the day load weighs still heavily upon us, says the *Electrical Review*, of London, and the practical solution of the problem seems to be as far off as ever. It has been claimed, with what at first sight appears to be a certain reasonableness, that the general adoption of motors on the lighting circuit would do something in the way of flattening the load curves. Motors, to some extent, have been tried, but it cannot be said that they have much furthered the matter. In the district of St. Pancras, as well as at Bradford, special terms have been offered to users of small powers, but generally speaking, small users have shown no great disposition to avail themselves of electric current for power purposes. The question which arises in one's mind is whether the number of motors which can be placed safely on a lighting circuit is likely to be remunerative or not, for we take it that one cannot keep on increasing motors on a lighting circuit to any indefinite extent. Of course, if lighting and power could be kept quite distinct, there would be little objection to urge against the placing of motors on a lighting circuit, that is, if the current for power purposes was used only at the time it was not required for lighting, but such a happy state of things is absolutely impossible on an ordinary supply company's circuit. In London the supply companies are often called upon for a heavy supply of current for lighting purposes during the day, and under these conditions it is not difficult to imagine the effect of suddenly throwing off or on the circuit of heavy motors. Then, again, to utilize motors in a manner satisfactory to the users, the supply company ought to be ready to turn on current at any time, for it is well known that the man who uses machinery which can be driven by small motors is a man in a modest way of business, who in the exigencies of his calling, is likely to want power at all hours.

It is obvious, therefore, that, to be commercially successful, lighting and power must be kept distinctly separate from each other, and those who are endeavoring to create a demand for power purposes must be prepared to lay down separate mains. This fact has been fully recognized by the Southampton Electric Light Company in the case of the cranes at the Southampton Docks. These cranes are called upon at all hours of the day and night to do heavy work, and, under the circumstances, the only rational arrangement was to have special mains. This, of course, is a real day load, but it is not the day load for which central station engineers have long hoped. At the same time it is a day load which fills up to the best advantage the idle hours of a central station, and will materially help the profits of any undertaking.

It has been urged by many that the use of electricity in the household for purely domestic purposes would have a marked effect on the day load. The objects of the advocates for such a use of electricity are most praiseworthy, and their efforts should be appreciated; but we cannot go beyond the line that with cooking there might be an increased consumption, if we may use the term, the day load would not be seriously affected, because, as we have already pointed out, as soon as it is worth the while of a company to supply electricity for power purposes, they must be prepared to lay down fresh mains.

It is difficult to see that electricity will compete successfully with gas for cooking and similar operations in the absence of storage. In the case of gas there is a constant pressure in the mains without the necessity of running machinery; so no matter whether the demand be small or large, it would not affect the efficiency of the gas plant. It is very different with electric machinery, for to supply power you must run your machines, no matter how little the load may be.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE contract for the lighting of the handsome new bridge at Wilmington, Del., has been awarded to the Wilmington Coal Gas Company, at its bid of $16.62 per lamp per annum. The structure carries 36 lamps.

AT the annual meeting of the Taunton (Mass.) Gas Light Company no change was made in the executive management.

IT is with sincere regret that we report the death of Mr. Peter McKay, who had been permanently identified with the works division of the Allegheny (Pa.) Gas Company for something over 21 years. His death, which occurred on the 17th inst., was the sequel of a long illness. His wife and five grown children survive. The funeral services were celebrated at St. Peter's Church, Allegheny, and interment was made in Monongahela cemetery, at Braddock, Pa.

ACCORDING to the Detroit *Journal*, Judge Frazer denied some days ago the application of the Detroit Gas Company for an injunction restraining the city from interfering with the purpose of the Company to make excavations on Woodward avenue to connect east and west side mains. In his decision Judge Frazer, after reviewing the facts, states that the real controversy, as to its cause, is the dispute over the price to be charged for gas. The new Company has taken the streets encumbered by the conditions of any one of the three organizations which, before consolidation, provided these conditions were legal and reasonable. The city claims that the Mutual Gas Company violated the ordinances and thereby invalidated its franchise. The Judge believes that the power to regulate the price of gas exists in the courts. A mandamus against the Company would lie if it refused to furnish gas at what the city deemed a reasonable figure. If the Company objected to this price then an issue of fact could be framed and testimony taken with a view of ascertaining what was a just price for the commodity. To Judge Frazer the most serious question is whether or not the Detroit Gas Company has a legal existence. The question is, could the Natural Gas Company consolidate with others organized for a different purpose. It might use the mains of the latter to supply to their patrons gas manufactured by them for fuel purposes; but could they use the mains for fuel gas brought from the fields of Ohio? While this doubt exists he claims that it would be unwise for the court to interfere. The claim is made by the Company that the work of connecting the mains east and west of the city can be done cheaper now before the paving of Woodward avenue is completed, and that if the connections are made gas can be more cheaply manufactured. On a mere matter of expense Judge Frazer holds that he is not warranted in issuing the injunction prayed for, while the legality of the existence of the Company is in doubt. Even without the desired injunction the Company can keep on furnishing gas to its consumers as usual. To grant the petition would be a recognition of the legal existence of the corporation, a matter which first of all should be determined. Judge Frazer further says that he is aware his decision can be reviewed by a higher court, and before a question, so important to the interests of the community is determined, the Circuit Court should not interfere to destroy the *statu quo* of the parties in the controversy. If he were sure the Sapreme Court would agree with him that the courts had the right to fix the price of gas, and that the consolidation of the three Companies was legal, there would be no harm done in allowing the connections to be made now. If, however, the contrary should be found by the court of last resort, then the corporation, without legal existence, would have a greater hold than ever upon the city with its east and west mains connected. Judge Frazer fails to see that the action of the Police and the Board of Public Works, in preventing the Gas Company from making the connections, was an outrage, as claimed by Mr. F. A. Baker, even after Judge Reilly had denied the city a temporary injunction. He believes that Judge Reilly refused to sanction a restraining order under the condition of the case as he found it, and that the police were justified in doing what they did to prevent the tearing up of the streets. The Company has appealed the case to the Supreme Court.

MR. CARROLL COLLINS, President-Superintendent of the Green Bay and Fort Howard (Wis.) Gas and Electric Light Company, was elected President of the Northwestern Electrical Association at the convention of that body held some days ago at Madison, Wis.

THE extension of the gas mains of the Gas Light Company of the city of New Brunswick, N. J., through the new bridge connecting New Brunswick with the suburb known as Highland Park, which is located on the east bank of the Raritan River, has proven a great success. Many

new consumers have been taken on, and Col. Newell is naturally in high feather over the outcome of the experiment.

THE Citizens Gas Company, of Gas City, Ind., has been incorporated. It is capitalized in $100,000.

"OBSERVER" forwards the following: "The annual meeting of the Attleboro (Mass.) Gas Light Company was held on the 18th inst. After the transaction of some routine business an election for officers was ordered with the following result: Directors, A. W. Sturdy, E. S. Capron, J. R. Bronson, H. M. Daggett, Jr., C. L. Watson, and the President and Vice-President *ex officio;* President, G. A. Dean; Secretary and Treasurer, A. W. Sturdy; Superintendent, E. S. Capron. It was also agreed that upon all gas bills paid before the 16th of each month there shall be granted a discount of 10 per cent., which agreement puts the net gas rate at $1.80 per 1,000 cubic feet. An arrangement was also made whereby Mr. F. Le Baron was appointed clerk and general office man, which decision was especially pleasing to Supt. Capron, whose labors will thus be considerably curtailed. The business of the Company shows a steady increase."

AT the annual meeting of the shareholders in the Consolidated Gas Company, of Baltimore, Md., the following Directors were chosen: E. C. Benedict, W. B. Brooks, Wm. F. Burns, Bernard Cahn, W. S. Carroll, G. A. von Lingen, W. F. Fricke, James A. Gary, John W. Hall, Henry James, D. D. Mallory and Wm. W. Spence. The Board subsequently perfected the following organization: President, John W. Hall; Vice-President, W. S. Carroll; Treasurer, Joseph W. Clarke; Secretary, N. T. Meginnis. The meeting was somewhat listless, only 60,000 votes having been cast out of a possible 107,000.

THE proprietors of the South Framingham (Mass.) Gas Company have ordered that hereafter those who use 50,000 cubic feet of gas and upwards per month are to be billed at the rate of 40 cents per 1,000 cubic feet. Ordinary consumers are to pay 50 cents per 1,000. A non-carbureted water gas is supplied, and Welsbach burners are the mediums for rendering it suitable for illuminating purposes. Several gas engines are in use in Framingham, notably a 32-horse machine in the shops of Messrs. Gilchrist & Taylor. The proprietors of the Framingham *Tribune* report that the 8 horse power gas engine now used to operate their presses—it replaced a 4-horse power steam engine—shows a saving in cost of operation over the old system of 33 per cent., not to make any note of an increase of 100 per cent. in the horse power developed.

A BILL for damages amounting to about $200 has been handed in to the town of Spencer, Mass., by the Spencer Gas Company. It is alleged that the heavy steam roller used on the main street that was macadamized in August, 1892, so strained and injured the gas mains that these latter were fractured in many places last winter during the heavy frosts of that period. It is claimed that the Company lost over $1,000 worth of gas in the interval of the locating and stopping of the leaks so caused. One large leak, on the high ground, near the Town Hall, was especially difficult to locate and stop, as was another near the foot of High street. The Company, however, only asks for reimbursement for actual expenses connected with the repairing of the breaks. During an informal discussion of the claim it was contended by some of the authorities that if the steam roller actually caused the damage last summer, the escapes of gas would have been noticed long before the frost came, and urge that the latter agent is really responsible for the Gas Company's loss. The matter will be discussed at a special meeting of the Town Board, and Judge Hill, President of the Gas Company, has been invited to make an exhaustive statement of the cause, as he understands it.

MESSRS. HINGSTON & Wing have erected a large plant in Buffalo, N.Y. (at the corner of Hamburg and Scott streets), for the manufacture of liquid carbonic acid gas.

THE offices of the Hot Springs (Ark.) Gas Company have been removed from the City Savings Bank building to a handsome and commodious building on Malvern avenue.

A MORTGAGE for $25,000 was recorded recently in the office of the Register of Essex county, N. J., made by the Montclair Gas and Water Company to Messrs. Frederick Frelinghuysen and J. P. Dusenbery.

The following, which is from a recent issue of the Newark (N. J.) *Call*, is given for what it is worth: "The gas deal, of which more or less has been said from time to time for the last three months, appears to have been postponed until the Fall. One of the parties in interest said some days ago that the differences between the two interests were not so great as to cause discouragement, but that nothing could be accomplished when the money market was in its present tight condition. The parties in this deal are somewhat mysterious, but they are said to represent 'Western interests,' and the scheme afoot is to get control of both the Newark Companies, the Jersey City plants and the Suburban Companies. Some New York and Newark capitalists are also interested. The following is given as the proposed basis of the sale of stock of the two Newark Companies to the syndicate: For each share Citizens Gas Company stock, par value of $50.

Syndicate bonds at 5 per cent. for	$80
" preferred stock at 6 per cent. for	20
" common stock	25
Cash	20
Total	$145

Estimated dividend of $5 cash per share in addition to above after final allotment. For each $50 share of Newark Company's stock the following:

Syndicate bonds at 5 per cent	$120
" preferred stock 6 per cent	30
" common stock	20
Cash	30
Total	$200

In addition to which a further cash dividend of $20 a share might be declared.

THE Council of Bayonne (N. J.) has agreed to accept the terms of the contract offered by the Bayonne and Greenville Gas Company. The Company will light the public gas lamps at the rate of $19.40 each per year, and the Company will supply gas to private consumers for $1.75 per 1,000. 25 electric arcs will be placed at the intersections most prominent in the town, and the charge therefor (2,000 candle power, all and every night schedule) will be 38 cents per lamp per night.

MRS. SALINDA EDSALL has brought suit in the Circuit Court against the Chicago Gas Light and Coke Company for $30,000. The claim is based on injuries resulting to plaintiff from the inhaling of gas that penetrated her dwelling, having escaped from the street mains of defendant, which mains, through defendant's fault, had not been kept in proper repair.

THE City Council, of Macon, Ga., has given formal notice to the Macon Gas Light and Water Company that at the end of 12 months the city will proceed under the law to buy the water works.

THE Hartford (Conn.) City Gas Company has notified its clerks that they are to have a half holiday each week during the month of August.

THE following report explains itself:

To the Honorable, the Board of City Trustees of Alameda, Cal.—I have the honor to herewith present my annual report for the fiscal year ended June 30th, 1893:

Electric Lights.—The station apparatus consists of two boilers, two engines, heaters, pumps and four dynamos. In the system of distribution there are 19½ miles of wire, 435 poles, 9 iron towers, 125 feet high, 3 towers, 100 feet high; 37 lamps on towers, while 54 lamps are suspended at street intersections from 40 foot poles and on most arms 45 feet high. The pole line is nearly 16 miles long; an average of 89 lamps were burning 1,490 hours. The total expense for maintaining, operating and extensions was $10,941, itemized as follows: Fuel, $3,286.50; carbons, $179.10; globes, $77.25; oil and waste, $99.45; hardware, $59.15; wire and cable, $99.45; keeping up horse, $96; new equipment and sundry repairs, $2,205.50; salaries of employees and extra labor, $4,837.65; total, $10,941. Deducting from this credit by rental of light, $31.50, makes net cost $10,909.50. Average price paid for coal, $7.35 per gross ton. Cost of lamps per hour, .0822 cents. There are now 90 lamps in service, which will be increased to 93 when your present order is filled. Table showing comparative cost for 5 years:

Year.	No. Lamps.	Hours Run.	Expenses.	Cost per Hour.
1889	82	1,247	$12,635.10	$.1086
1890	85	1,281	11,401.84	.1019
1891	91	1,292	14,597.91	.1241
1892	89	1,420	12,018.21	.0955
1893	89	1,490	10,909.50	.0822

AT a meeting of the Directors of the Gas Light Company of Augusta, Ga., held on the 19th inst., there were present: George T. Barnes (President), H. B. Adam (Secretary), and Messrs. P. H. Langdon, Thomas G. Barrett and Leonard Phinizy. After the organization of the meeting the President, before proceeding to regular business, called attention to the fact that since the last meeting of the Board, one of the members (Mr. E. R. Schneider) had departed this life. He thereupon submitted the following tribute to his memory, which, on motion of Mr. Leonard Phinizy, was directed to be recorded on the minutes and published in the city papers, and that a copy of the same be transmitted to each of the surviving nephews and nieces of Mr. Schneider: "The loss which this community has sustained in the death of Mr. Ernest R. Schneider has been voiced through the public press of the city. The large concourse of all classes and creeds, who followed the remains to the last resting place, attest the esteem in which he was held by the entire body of his fellow-citizens. Born in Germany, and coming to Augusta when a mere boy, he had passed a full half century among our people. Starting life with but very limited resources, he attained wealth, influence and honor. Throughout this long career he won and deserved the respect which he always received. Truth was the basis of his character, and in all his dealings with his fellow-men, both as a merchant and as a man, not the slightest suspicion was ever cast upon his word nor the slightest doubt ever felt as to any engagement into which he entered. Urbane in manners, social in his nature, given to the exercise of a generous hospitality, he was a delightful companion and friend. His strong native intellect was well cultivated. Without being an extensive he was a liberal reader of books; he kept himself fully informed on the topics of the day, and he had amassed a large amount of information concerning the local history and traditions of Augusta, which made him, in his leisure hours, a most interesting and instructive conversationalist. No man was ever more thoroughly identified with Augusta than he was. Without going elsewhere he found ample room here for his investment of capital, and thus always fostered home enterprise and industry. Those who knew him best will always bear testimony to his charitable nature. To public appeals he always responded, but his private charities were without number. He was a giver who loved to aid the poor, the unfortunate and the distressed. In many, very many instances, the only witnesses of these acts were the recipients of his kindness. This man's countenance, open, generous and benevolent, was a reflex of his nature. To this general verdict we, the Board of Directors of the Gas Light Company of Augusta, desire to add our special testimonial. Mr. Schneider was elected a member of this Board at the annual meeting in February, 1867, and was re elected at each annual meeting thereafter. His connection with this Board was thus uninterruptedly pursued for more than 26 years, and continued until finally dissolved by death. Intimate with its history and affairs, deeply interested in its success, and possessed of a clear and discriminating judgment, he was always a wise counsellor in our deliberations. Modest and gentle in his demeanor, his fellow-members became strongly attached to him by the ties of friendship, and all recognized how greatly in his long service he had contributed to the success and prosperity of the Company. He was seldom absent from our meetings. His death creates a void here it is not easy to fill. We, the surviving members of this Board, will long continue to miss his presence and mourn his loss, and we now place on our records this feeble tribute to his memory."

ARTICLES incorporating the Dayton (O.) Gas and Fuel Company have been filed. The incorporators are Messrs. E. R. Leland, Fred. Reibold, Ed. W. Hanley, John A. McMahon and Henry Ferneding. The officers are: President and Treasurer, E. R. Leland; Secretary, E. W. Hanley.

ARTICLES of incorporation have also been filed which purport to give birth to the Peoples' Gas Light and Construction Company of Davenport, Iowa. The capital is put at $500,000.

AT the annual meeting of the shareholders in the Municipal Gas Company, of Albany, N.Y., the following Directors were elected: Roswell P. Flower, E. C. Benedict, Y. Howard King, Robert C. Pruyn, William McEwan, John E. McElroy and A. N. Brady. The Board organized as follows: President, Anthony N. Brady; Vice-President, Robert C. Pruyn; Treasurer, John E. McElroy.

THE Town Committee of Newton, N. J., and the proprietors of the Newton Gas Light Company have reached an agreement in respect to the public lighting of that place, under which the gas lamps are to be again put in use for a period of six months.

AT the annual meeting of the San Francisco Edison Light and Power Company 14,984 shares of the 15,766 shares of stock issued were represented. The Directors chosen were Messrs. Geo. H. Roe, Gustave Sutro, L. T. Haggin, Willis E. Davis, John R. Spring, P. B. Cornwall and Arthur W. Moore; President, G. H. Roe; Vice-President. Gustave Sutro; Secretary, Joseph E. Green; Treasurer, the Bank of Nevada. The Company's dividend is at the rate of 8 per cent. per annum.

AT the annual meeting of the Taunton (Mass.) Gas Light Company the following officers were chosen: Directors, John E. Sanford, Zacheus Sherman, Edward Mott, James Y. Anthony, William C. Davenport, Ezra Davol and James M. Remington; President, John E. Sanford; Treasurer and Agent, Henry B. Leach.

A LICENSE to incorporate the Champaign (Ills.) Fuel and Gas Light Company has been issued to one Warren Maltby.

PRESIDENT EASTLAND, of the Stockton (Cal.) Gas, Light and Heat Company, is our authority for the statement that extensive improvements are underway on that plant. The chief items in the betterments are a holder rated to contain 180,000 cubic feet, and the placing of several miles of mains. He believes the contracts will be completed by October 1st.

AT the annual meeting of the Easthampton (Mass.) Gas Company a semi-annual diuidend of 3 per cent. was declared, and the following officers were elected: Directors, E. T. Sawyer, John Mayher and Granville H. Leonard; President, E. T. Sawyer; Treasurer, George L. Manchester.

THE shareholders of the Beverly (Mass.) Gas Company have chosen the following officers: John I. Baker, Andrew W. Rogers, F. H. Winslow, S. W. Winslow and Charles F. Prichard: President, Hon. John I. Baker; Treasurer, A. W. Rogers.

THE election for Directors by the proprietors of the Gloucester (Mass.) Gas Light Company resulted in the choice of Messrs. George R. Bradford, George H. Perkins, Robert R. Fears, Charles S. Tappan and John A. Coffin.

AT the annual meeting of the Long Branch (N. J.) Gas Company the following Directors were chosen: H. E. Gawtry, George N. Curtis, George F. Baker, Jacob Steinbach and C. H. Irwin.

THE Commission to determine the value of the Bay State Gas Company's plant, etc., will consist of Mr. George O. Shattuck, Colonel Thomas L. Livermore and Otis Kimball, these gentlemen having been appointed, on Tuesday last, by Judge Barker, of the Supreme Court, under the provisions of the Lyford Act. The persons named were agreed upon by Mayor Matthews and the counsel for the Gas Company. Mr. Shattuck is a well known lawyer, of Boston, and is senior member of the firm of Shattuck & Monroe. Colonel Livermore, who was formerly Park Commissioner of Boston, is a well known patent lawyer, and was at one time agent for the Amoskeag Mills, at Manchester, N. H. Mr. Otis Kimball is Treasurer of the Louisville, Evansville and St. Louis Railroad Company, was at one time President of the Boston Water Power Company, and some years ago was Treasurer of the Post Publishing Company. The Commissioners will begin hearings at once.

WE make no doubt that this Committee will, in so far as it is capable, endeavor to fairly appraise the property under the control of the Bay State Company, and may possibly arrive at a conclusion that will be satisfactory to the Mayor and to Mr. Addicks. Meanwhile we beg leave to suggest that the ultimate findings of such a body would carry far greater weight did it have in its composition at least one qualified gas works constructor or gas engineer. Two lawyers and one railroad man may be equal to the task of valuing a gas works property, but laymen will be forgiven for believing that two gas engineers might know more about such things than two lawyers, or one lawyer and one railroad man, etc.

THE Milwaukee (Wis.) Gas Light Company is about to establish the system of branch collection offices that has been tried so successfully at Chicago and other points. The American Express Company is to have charge of the system.

THE Windsor Locks (Conn.) Electric Light Company has notified its consumers that on and after September 1st a considerably higher price than that now demanded will be charged for each 16-candle power incandescent lamp supplied. The increase will amount to 25 per cent. all around.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,

PROPRIETORS.

MONDAY, JULY 31, 1893.

The Market for Gas Securities.

Consolidated sold down to 108 since the last time of writing, and the maximum price during that interval was 120; and these violent fluctuations were the result of a recorded trading on the Exchange during the week of but 2,500 shares. This shows how completely demoralized the market is, and it is not safe to venture any prediction as to the outcome. One thing, however, is certain, and that is that Consolidated is intrinsically worth more to-day than at any previous period of its history. The opening (Friday) was made at 116 to 116¼. Other city shares are dull and neglected. The Brooklyn situation is about as before, although it does begin to look that Mr. Addicks is slowly working his way to the consolidation point. The shares are nominally lower, but there is really nothing doing in them. Chicago gas outskyrocketed itself this week—the highest quotation having been 35½, and the lowest 44½. This range was made on recorded sales of 181,300 shares for the week ended July 27th. It opened to day at 50¾ to 51½. It would be cheap at 85. Bay State is very dull at 10½ to 12, Laclede common is weak, at 13 to 13½, and Baltimore Consolidated is reported at 50¾ to 51½.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 Wall St., New York City.

July 31

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	116	116¼
Central	500,000	50	90	95
" Scrip	220,000	—	—	100
Equitable	4,000,000	100	170	175
" Bonds	1,000,000	—	106	108
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	115
Mutual	3,500,000	100	139	142
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20,000	—	—	—
Standard Gas Co—				
Common Stock	5,000,000	100	35	40
Preferred	5,000,000	100	80	85
Yonkers		50	112	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	—	113
Citizens	1,200,000	20	99¾	100
" S. F. Bonds	320,000	1000	—	103
Equity Gas Light Co	2,000,000	100	—	—
Bonds	1,000,000	—	—	60
Fulton Municipal	3,000,000	100	125	—
" Bonds	300,000		102	—
Peoples	1,000,000	10	—	92
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	—
Metropolitan	870,000	100	—	123
" Bonds (5's)	70,000	—	100	—
Nassau	1,000,000	25	150	—
" Ctfs	700,000	1000	99	100
Williamsburgh	1,000,000	50	130	—
" Bonds	1,000,000	—	107	110

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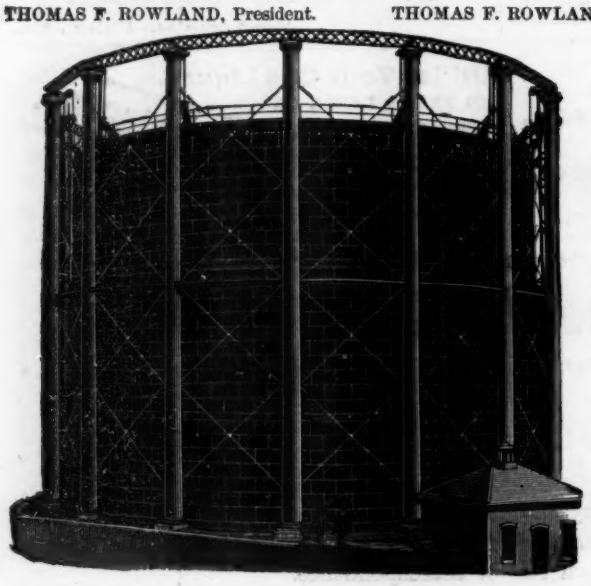

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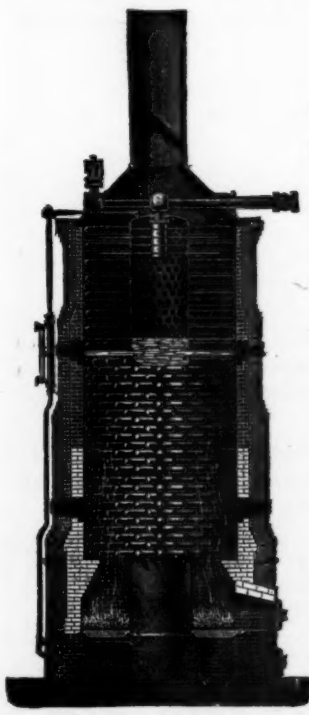

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The only Genuine Hazelton or Porcupine Boilers bear our Three Registered Trade Marks.

∴ BEWARE OF IMITATIONS. ∴

This Company is prepared to Manufacture and Furnish Plants of Boilers of any desired capacity, and will forward proposals and other information on application. All imitations of the substantial features of this Boiler are infringements, and will be prosecuted to the full extent of the law.

THE HAZELTON BOILER CO.,

Sole Proprietors and Manufacturers, NEW YORK, U. S. A.

Cable Address, "PAILA," NEW YORK.

WRITE FOR ILLUSTRATED CATALOGUE.
Correspondence Solicited.

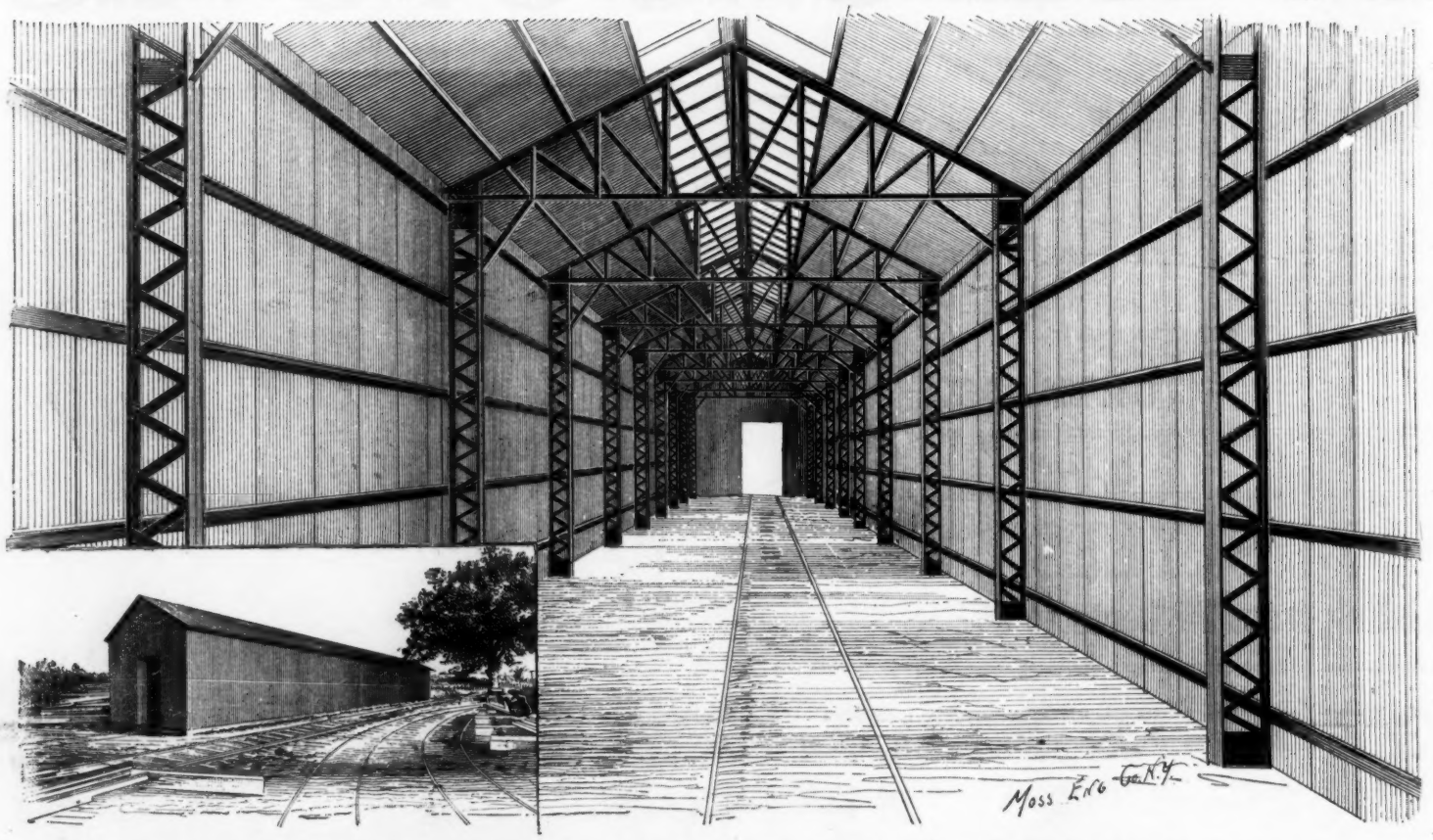
Long Distance Telephone, 1229-18th St., New York.

This Boiler is producing unequaled results in the works of most of the principal Gas Co.'s of the U.S., and in similar plants in Foreign Countries.

NOT CONNECTED WITH ANY OTHER CONCERN IN THE UNITED STATES.

CHAS. M. JARVIS, Prest. & Chief Engineer BURR K. FIELD, Vice-President. FRANK L. WILCOX, Treasurer. GEO. H. SAGE, Secretary

THE BERLIN IRON BRIDGE CO.



The above illustration is taken direct from a photograph, and is an interior view in a Store Room designed and built by us for our own use here at East Berlin. The construction particularly commends itself on account of the large amount of side wall space applicable for storage purposes, the light being introduced entirely from the roof, no side windows being used, thus allowing all the wall space for storage.

Write for Illustrated Catalogue.

Office and Works, No. 6 Railroad Avenue, East Berlin, Conn.

HIGH CANDLE POWER
FROM
GAS.

MR. WALTON CLARK, Assistant General Superintendent, United Gas Improvement Co.:

Dear Sir—In accordance with your request, I have made several tests of the new Welsbach mantel (called No. 169) for candle power and efficiency, and I herewith submit the following results:

	Candle Power.	Pressure.	Gas Consumed.	C.P. per Cu. Ft.
Average of Test No. 1,	67.05	.95 in.	2.6	25.70
" " No. 2,	63.86	1.00 in.	2.86	22.30
" " No. 3,	72.50	2.1 in.	2.87	25.26

The above averages are the results of trials on three different occasions, and in each case the mantles tested were made from a different lot of fluid.

The mantles used in the above tests were selected at random, and all had been dipped in kristaline and dried ready for shipment.

It is quite possible that better results could have been obtained by manipulating and readjusting the position of the mantles on the galleries, and also by waiting a longer period after burning off the kristaline; but I considered such fine adjustment undesirable in determining the commercial candle power.

These tests were made on a bar photometer against a regular Edgerton standard slit. The candle power of the slit was 6.18, and the gas used was Gloucester City water gas, 26 candle power.

Very truly yours,
(Signed) C. H. PAGE, JR., M.E.

WE ARE NOW PREPARED TO FILL ALL ORDERS PROMPTLY FOR
HIGH CANDLE POWER WELSBACH LIGHTS.
Gloucester, N. J. WELSBACH LIGHT CO.

NEWBIGGING'S HANDBOOK FOR GAS ENGINEERS AND MANAGERS.

The present (the fifth) edition marks an important advance on those that have gone before. Considerable additions have been made to the text and much of it has been rewritten and otherwise improved. Price, cloth, $6. A. M. CALLENDER & CO., 32 Pine St. N. Y

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ESTABLISHED 1834. INCORPORATED 1863.

NEW YORK and PHILADELPHIA.

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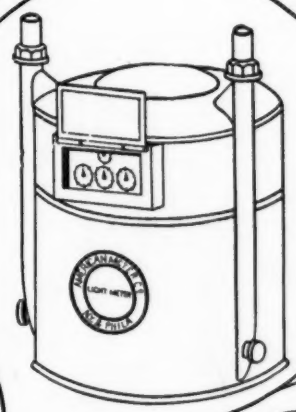
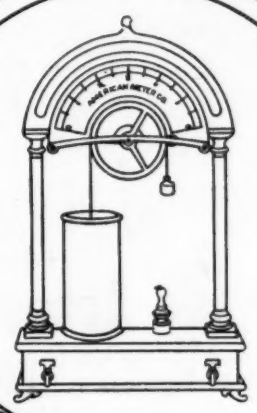
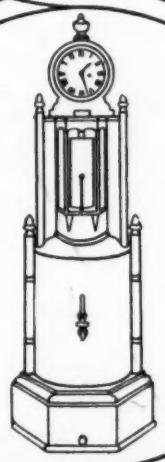
ST. LOUIS, SAN FRANCISCO.



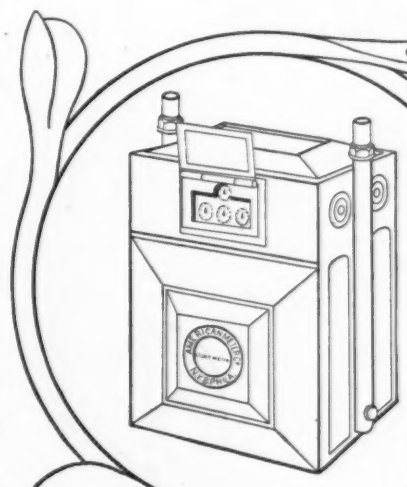


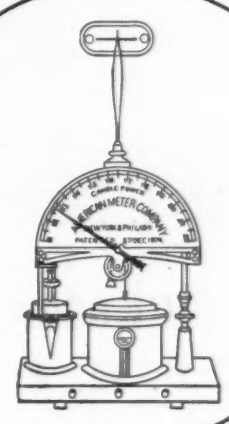


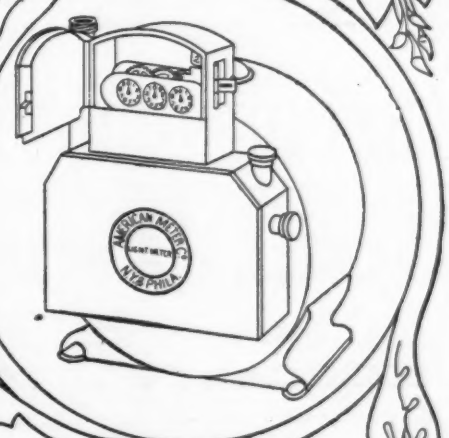
PUBLIC LIGHTING TABLE.

AUGUST, 1893.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P. M.	A. M.
Tue.	1	7.40 PM	10.30 PM	7.10	3.30
Wed.	2	7.40	10.50	7.10	3.30
Thu.	3	7.40	11.10	7.10	3.30
Fri.	4	7.40 LQ	11.40	7.10	3.30
Sat.	5	7.40	12.10 AM	7.10	3.30
Sun.	6	7.40	1.00	7.10	3.45
Mon.	7	7.40	1.50	7.10	3.45
Tue.	8	7.40	4.10	7.10	3.45
Wed.	9	7.40	4.10	7.10	3.45
Thu.	10	7.40	4.10	7.10	3.45
Fri.	11	7.30 NM	4.10	7.10	3.45
Sat.	12	7.30	4.10	7.10	3.45
Sun.	13	7.30	4.10	6.55	4.00
Mon.	14	7.30	4.10	6.55	4.00
Tue.	15	7.30	4.10	6.55	4.00
Wed.	16	8.30	4.10	6.55	4.00
Thu.	17	8.50	4.10	6.55	4.00
Fri.	18	9.20	4.10	6.55	4.00
Sat.	19	9.50 FQ	4.20	6.55	4.00
Sun.	20	10.30	4.20	6.45	4.10
Mon.	21	11.10	4.20	6.45	4.10
Tue.	22	12.10 AM	4.20	6.45	4.10
Wed.	23	1.10	4.20	6.45	4.10
Thu.	24	2.10	4.20	6.45	4.10
Fri.	25	No L.	No L.	6.45	4.10
Sat.	26	No L.	No L.	6.45	4.10
Sun.	27	No L. FM	No L.	6.30	4.20
Mon.	28	7.10 PM	8.30 PM	6.30	4.20
Tue.	29	7.10	8.50	6.30	4.20
Wed.	30	7.10	9.20	6.30	4.20
Thu.	31	7.10	9.40	6.30	4.20



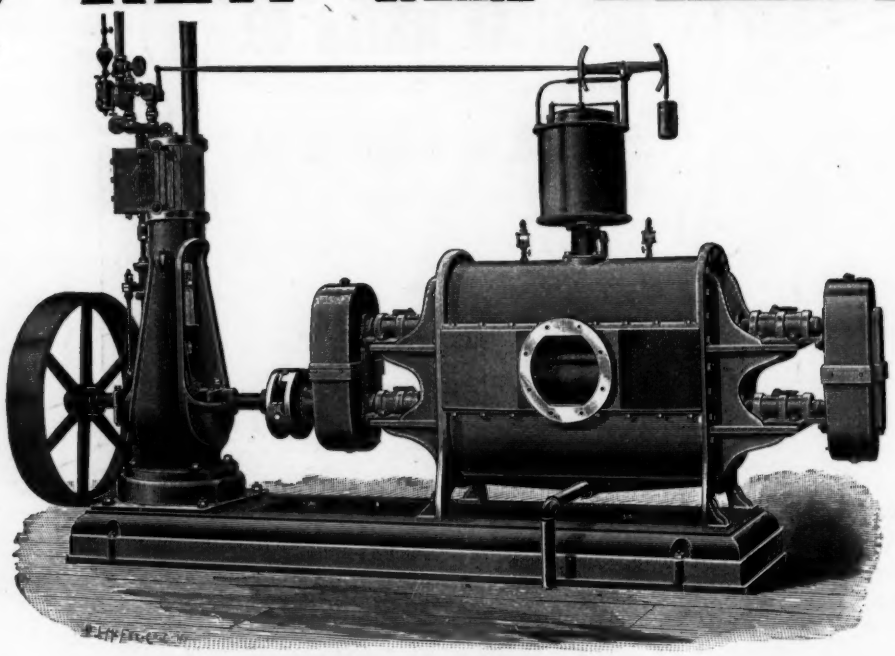




TOTAL HOURS LIGHTING DURING 1893.

	By Table No. 1. Hrs.Min.	By Table No. 2. Hrs.Min.
January...	217.30	423.20
February..	200.30	355.25
March	177.50	355.35
April.....	160.30	298.50
May.....	149.00	264.50
June.....	140.30	234.25
July	143.40	243.45
August....	154.50	280.25
September.	171.50	321.15
October....	202.20	374.30
November.	221.30	401.40
December.	248.50	433.45
Total..	2188.50	3987.45

ROOTS' NEW GAS EXHAUSTER.



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Neatness of Design, Durability, Simplicity, Efficiency, and Economy of Power.

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The Parts Needing Attention are External, and Easily Accessible.

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CYCLOIDAL EXHAUSTER,

the internal operating parts of which consist of two Revolvers, each p'aned accurately on cycloidal lines, the only Exhauster so constructed.

SIMPLICITY ✻ EFFICIENCY ✻ DURABILITY.

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MR. T. VINER CLARKE, of London, Eng., having compiled a novel Chart or Map illustrating the various

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In the form of a Genealogical Tree, including all the products discovered to date (the total number amounting to near 700), offers for sale a limited number of copies in Colors, mounted on Linen, with Rollers. Price, $3.50. Orders may be sent to

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DREXEL BUILDING, PHILA., PA.

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ALTEN S. MILLER, Agent.

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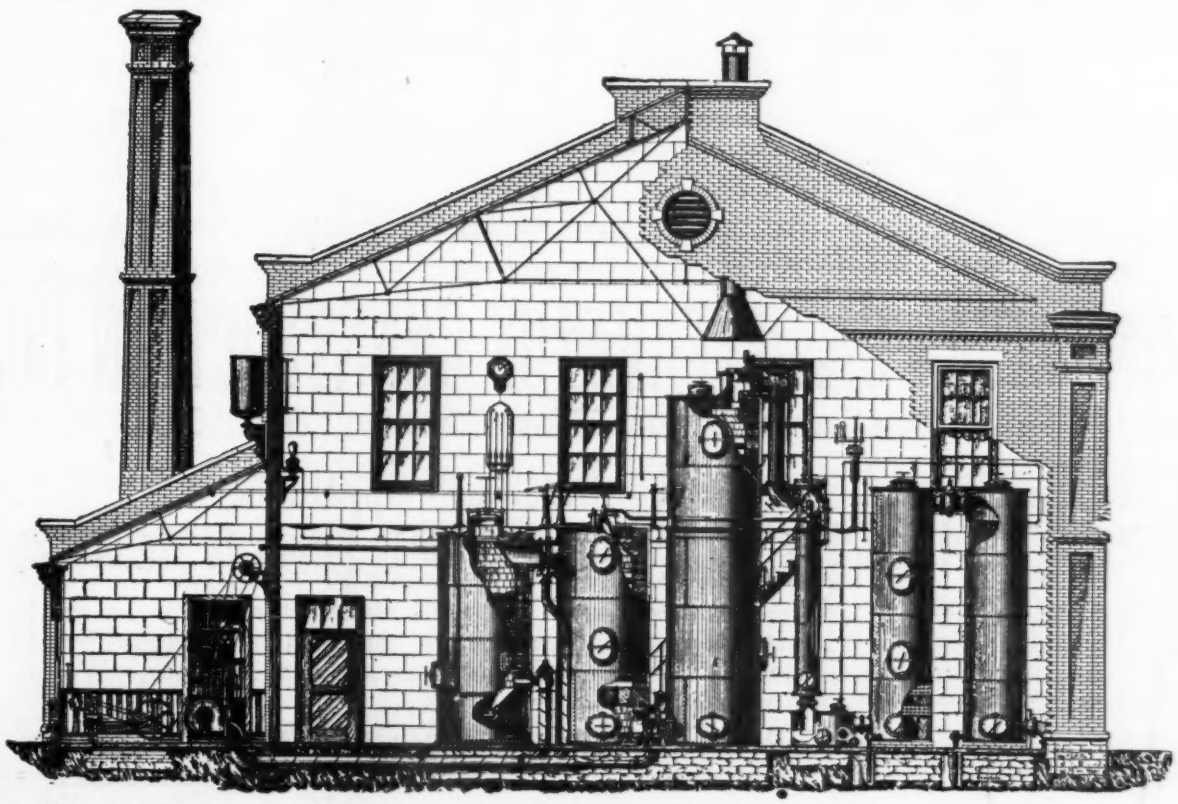
THE STANDARD LOWE WATER GAS APPARATUS.



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Gentlemen—We are in receipt of your favor of the 16th, advising us the National Gas Light and Fuel Company, of Chicago, will discontinue their advertisement from July 1st, and offering us the space occupied by them since 1885.

In thanking you for remembering us and for your kind expressions, it affords us great pleasure to advise you that we have decided to accept your proposition, as we fully realize the excellent advertising facilities afforded through the GAS LIGHT JOURNAL. In doing so we are also complying with repeated suggestions from the many friends we have gained in the fraternity, who have tried us with their orders. Our previous hesitancy in extending our advertising was due to the fact that, with our best efforts, we were unable to increase our facilities to meet the growing requirements; but with our new shop, to be completed this month, and which is being fitted up with special tools designed for the finishing of Gas Apparatus, we feel confident of being able to turn out all work intrusted to us promptly and in a first-class manner. We have taken the precaution to provide for any future extensions which may prove necessary. We now hope to extend our business relations with the fraternity, and will do our best to deserve it by prompt and first-class work and reasonable prices.

Yours very truly,
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By O. N. GULDLIN, Prest.

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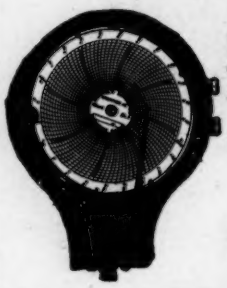

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Low in Price,
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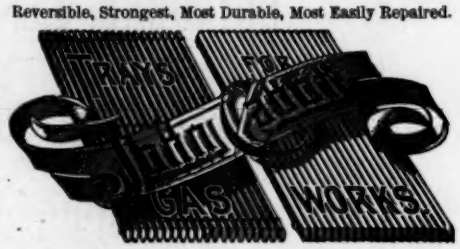

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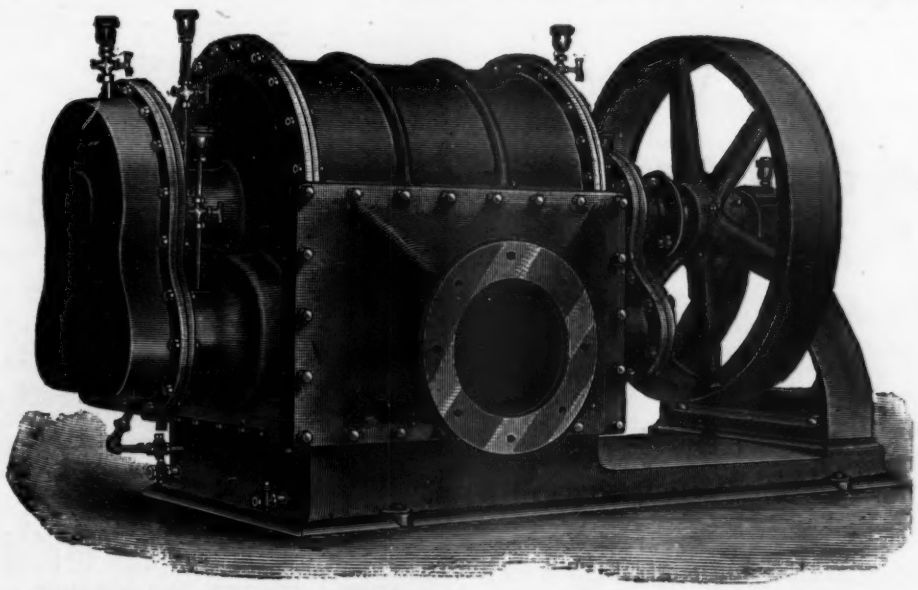

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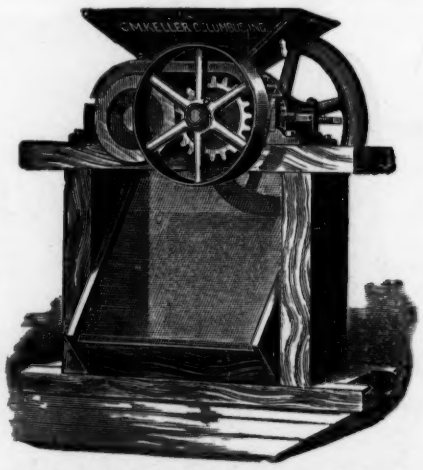

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Also, SPLINT AND STEAM COALS,

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GAS NAPTHA.

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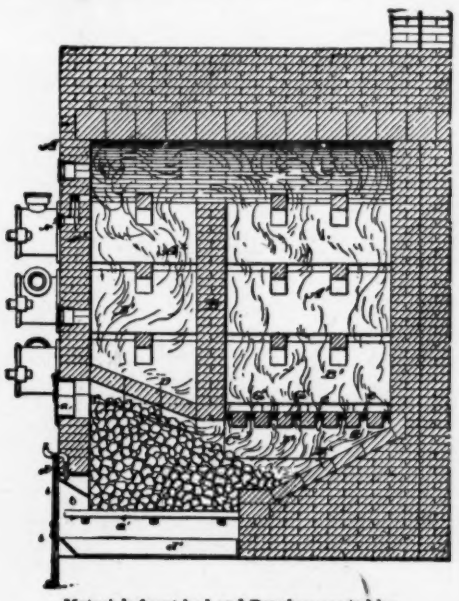

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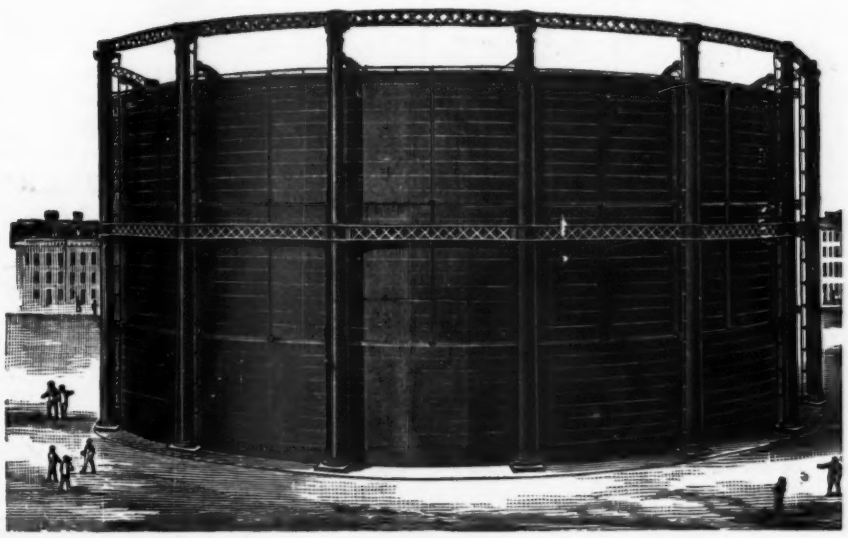

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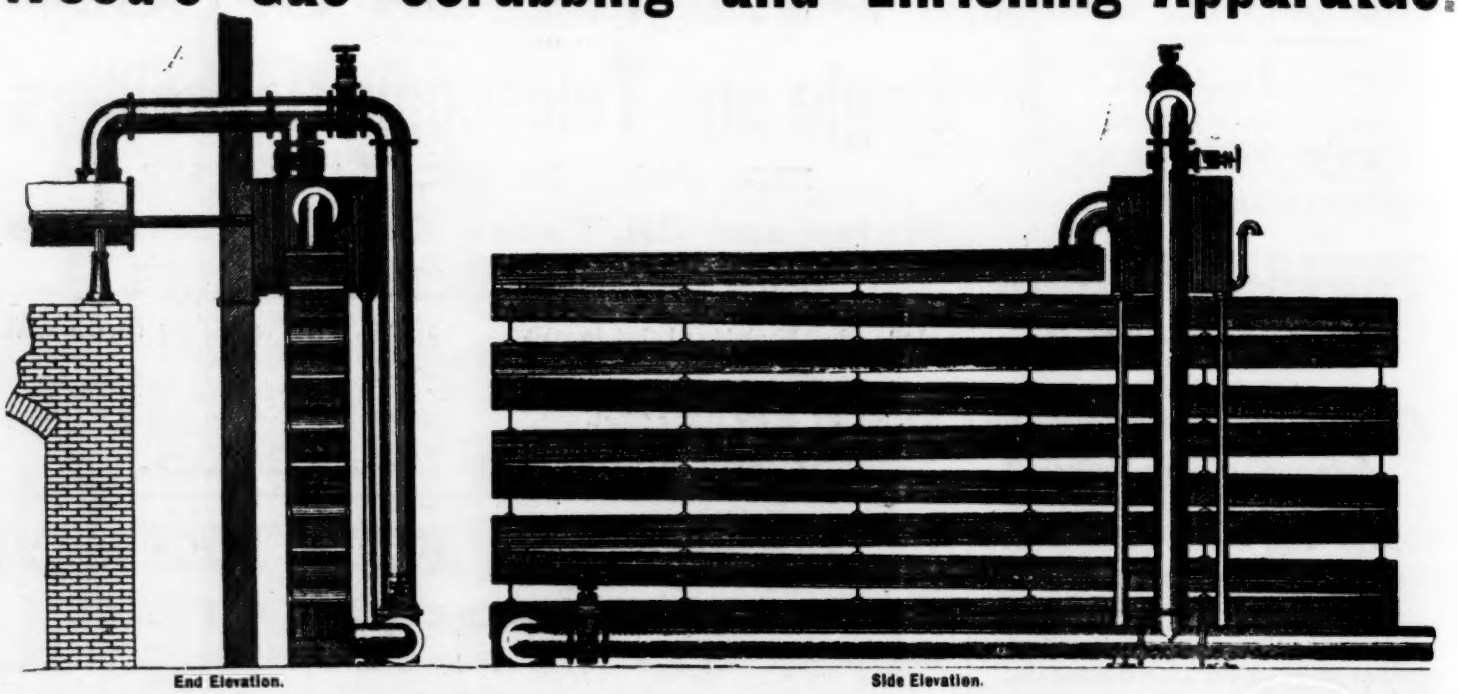

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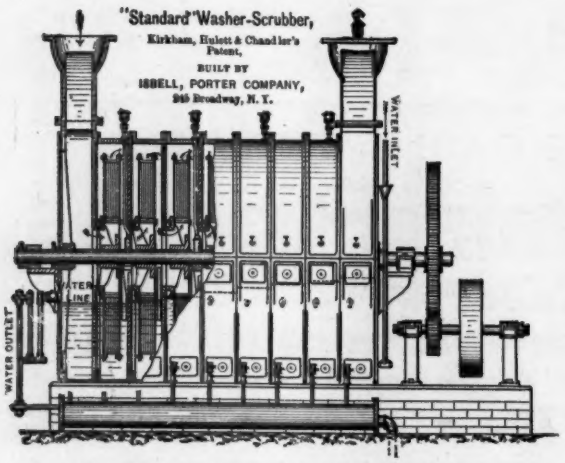

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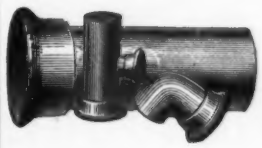

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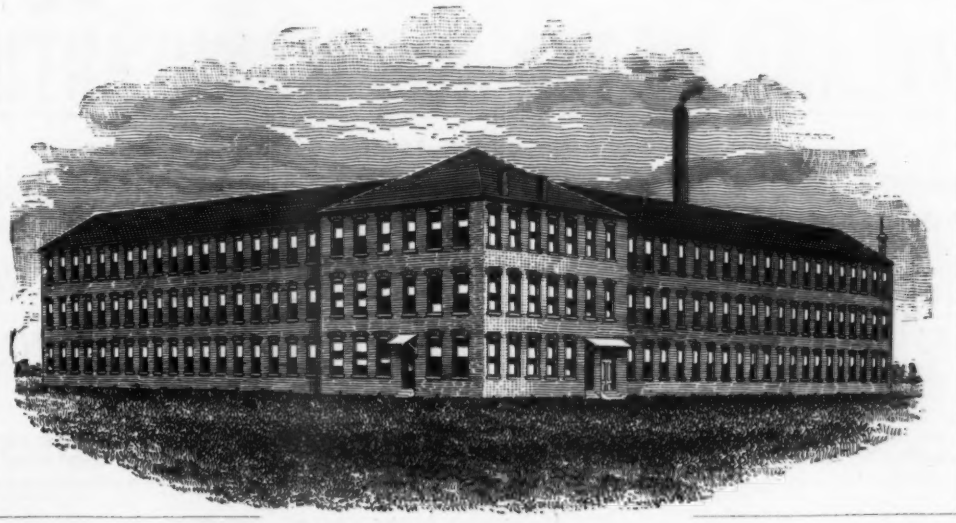

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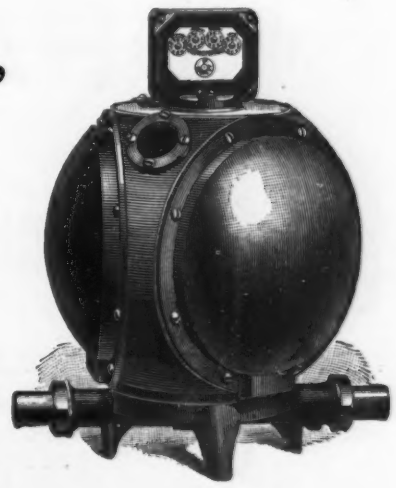

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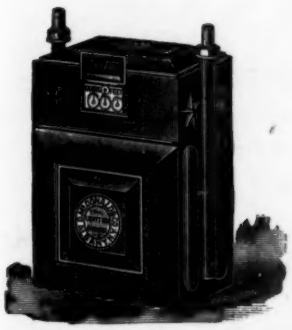

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Stove.	*Oven.*	*Broiler.*	*Top.*
31 inches high.	9¼ inches high.	10 inches high.	21 inches high.
17 inches wide.	15 inches wide.	15 inches wide.	16 inches wide.
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